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FILE COVERS 1907 - 27 Jan 2009 VOL 150 ISS 5
 FILE LAST UPDATED: 26 Jan 2009 (20090126/ED)

HCAPLUS now includes complete International Patent Classification (IPC) reclassification data for the third quarter of 2008.

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This file contains CAS Registry Numbers for easy and accurate substance identification.

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L108 ANSWER 1 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2005:564516 HCAPLUS Full-text
 DN 143:81150
 TI Chemical protection of a lithium surface
 IN De Jonghe, Lutgard; Visco, Steven J.; Nimon, Yevgeniy S.; Sukeshini, A. Mary
 PA Polyplus Battery Co., USA
 SO U.S., 16 pp.
 CODEN: USXXAM
 DT Patent
 LA English
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6911280	B1	20050628	US 2002-327682	20021220 <--
	US 20050186469	A1	20050825	US 2005-92781	20050328 <--
	US 20080113261	A1	20080515	US 2007-944906	20071126 <--
PRAI	US 2001-342326P	P	20011221	<--	
	US 2002-327682	A1	20021220		
	US 2005-92781	A3	20050328		

AB Disclosed are compns. and methods for alleviating the problem of reaction of lithium or other alkali or alkaline earth metals with incompatible processing and operating environments by creating a ionically conductive chemical protective layer on the lithium or other reactive metal surface. Such a chemical produced surface layer can protect lithium metal from reacting with oxygen, nitrogen or moisture in ambient atmospheric thereby allowing the lithium material to be handled outside of a controlled atmospheric, such as a

dry room. Production processes involving lithium are thereby very considerably simplified. One example of such a process in the processing of lithium to form neg. electrodes for lithium metal batteries.

IC ICM H01M0002-08
ICS H01M0010-04; H01M0010-26

INCL 429137000; 429246000; 429231900; 429231950; 429309000; 429319000;
429320000; 429321000; 429322000; 429126100

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 57

ST battery lithium surface chem protection

IT Battery anodes
Battery electrolytes
Coating materials
Electric conductors, glass
Evaporation
Glass ceramics
Polymer electrolytes
(chemical protection of lithium surface)

IT Carbonates, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(chemical protection of lithium surface)

IT Polymerization
(vapor; chemical protection of lithium surface)

IT 124-38-9, Carbon dioxide, processes 7664-38-2, Phosphoric acid, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(chemical protection of lithium surface)

IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 623-53-0, Ethyl methyl carbonate 7439-93-2, Lithium, uses 7440-09-7, Potassium, uses 7440-23-5, Sodium, uses 7440-50-8, Copper, uses 7704-34-9, Sulfur, uses 70780-99-3, Lisicon 77641-62-4, Nasicon 302600-21-1
RL: DEV (Device component use); USES (Uses)
(chemical protection of lithium surface)

IT 463-79-6D, Carbonic acid, alkaline earth salt 463-79-6D, Carbonic acid, alkali metal salt
RL: TEM (Technical or engineered material use); USES (Uses)
(chemical protection of lithium surface)

IT 7440-55-3, Gallium, uses 10377-52-3, Lithium phosphate 12024-22-5, Gallium sulfide (Ga₂S₃) 12025-34-2, Germanium sulfide (GeS₂) 12136-58-2, Lithium sulfide (Li₂S) 13759-10-9, Silicon sulfide (SiS₂) 184905-46-2, Lithium nitrogen phosphorus oxide
RL: DEV (Device component use); USES (Uses)
(glass; chemical protection of lithium surface)

IT 77641-62-4, Nasicon
RL: DEV (Device component use); USES (Uses)
(chemical protection of lithium surface)

RN 77641-62-4 HCAPLUS

CN Nasicon (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IT 10377-52-3, Lithium phosphate
RL: DEV (Device component use); USES (Uses)
(glass; chemical protection of lithium surface)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



● 3 Li

RE.CNT 17 THERE ARE 17 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 2 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2005:78054 HCAPLUS Full-text

DN 142:159575

TI Method for fabricating composite electrodes for
batteries using liquid polymer electrolytes

IN Yoon, Sang Young; Ph, Bookeun; Amine, Khalil

PA USA

SO U.S. Pat. Appl. Publ., 12 pp., Cont.-in-part of U.S. Ser. No. 104,352.

CODEN: USXXCO

DT Patent

LA English

FAN.CNT 14

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI US 20050019656	A1	20050127	US 2004-496231	20040520 <--
US 20030180624	A1	20030925	US 2002-104352	20020322 <--
WO 2003083970	A1	20031009	WO 2003-US2127	20030122 <--
W:				
AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN,				
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,				
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,				
LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH,				
PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ,				
UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW:				
GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY,				
KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES,				
FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR, BF,				
BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
WO 2003083971	A1	20031009	WO 2003-US2128	20030122 <--
W:				
AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN,				
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,				
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,				
LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH,				
PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ,				
UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW:				
GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY,				
KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES,				
FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR, BF,				
BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
WO 2003083974	A1	20031009	WO 2003-US8783	20030320 <--
W:				
AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN,				
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,				
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,				
LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM,				
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT,				
TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW:				
GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY,				
KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES,				

	FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	US 20050106470	A1	20050519	US 2004-962125	20041007
	US 20070065728	A1	20070322	US 2006-346087	20060202 <--
PRAI	US 2002-104352	A2	20020322	<--	
	WO 2003-US2127	A	20030122		
	WO 2003-US2128	A	20030122		
	US 2003-443892P	P	20030130		
	US 2003-446848P	P	20030211		
	US 2003-451065P	P	20030226		
	WO 2003-US8783	W	20030320		
	US 2002-72739	B2	20020208	<--	
	US 2002-167940	A	20020612	<--	
	US 2004-542017P	P	20040204		
	US 2004-543898P	P	20040211		
	US 2004-543951P	P	20040211		
	US 2004-810019	A2	20040325		
	US 2004-810080	A2	20040325		
	US 2004-810081	A2	20040325		
	US 2004-563848P	P	20040419		
	US 2004-563849P	P	20040419		
	US 2004-563850P	P	20040419		
	US 2004-563852P	P	20040419		
	US 2004-565211P	P	20040422		
	US 2004-496231	A2	20040520		
	US 2004-601452P	P	20040813		
	US 2004-962125	A2	20041007		
	US 2004-971912	A2	20041021		
	US 2005-53338	A2	20050208		
	US 2005-56866	A2	20050210		
	US 2005-56867	A2	20050210		
	US 2005-56868	A2	20050210		
	US 2005-56869	A2	20050210		
	US 2005-668878P	P	20050405		
	US 2005-211970	A2	20050824		
	US 2005-271473	A2	20051110		
	US 2005-272261	A2	20051110		
AB	Disclosed is a method for manufacturing electrodes for electrochem. devices such as batteries and capacitors in which a viscous polysiloxane polymer electrolyte is incorporated into the slurry of materials forming the electrode. The optional addition of protective additives to the slurry is also disclosed. A follow-on vacuum impregnation step is disclosed to further improve penetration and wetting by the electrolyte.				
IC	ICM H01M0004-04				
	ICS H01M0004-62; H01M0004-52				
INCL	429217000; 141001100; 429231950; 429231600; 429231300; 429231100; 429223000; 029623500; 029623200				
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology)				
	Section cross-reference(s): 38, 76				
ST	electrode composite battery liq polymer electrolyte				
IT	Natural rubber, uses				
	Nitrile rubber, uses				
	Styrene-butadiene rubber, uses				
	RL: MOA (Modifier or additive use); USES (Uses)				
	(binder; method for fabricating composite electrodes for batteries using liquid polymer electrolytes)				
IT	Crystal whiskers				
	(graphite; method for fabricating composite electrodes for batteries using liquid polymer				

- IT electrolytes)
- IT Carbon fibers, uses
 - RL: MOA (Modifier or additive use); USES (Uses)
 - (graphite; method for fabricating composite electrodes for batteries using liquid polymer electrolytes)
- IT Polymers, uses
 - RL: DEV (Device component use); USES (Uses)
 - (liquid, saturated; method for fabricating composite electrodes for batteries using liquid polymer electrolytes)
- IT Secondary batteries
 - (lithium; method for fabricating composite electrodes for batteries using liquid polymer electrolytes)
- IT Capacitors
 - (method for fabricating composite electrodes for batteries using liquid polymer electrolytes)
- IT Intermetallic compounds
 - Polyoxyalkylenes, uses
 - Polysiloxanes, uses
 - RL: DEV (Device component use); USES (Uses)
 - (method for fabricating composite electrodes for batteries using liquid polymer electrolytes)
- IT Carbon black, uses
 - RL: MOA (Modifier or additive use); USES (Uses)
 - (method for fabricating composite electrodes for batteries using liquid polymer electrolytes)
- IT Fluoropolymers, uses
 - RL: MOA (Modifier or additive use); USES (Uses)
 - (method for fabricating composite electrodes for batteries using liquid polymer electrolytes)
- IT Metallic fibers
 - RL: MOA (Modifier or additive use); USES (Uses)
 - (method for fabricating composite electrodes for batteries using liquid polymer electrolytes)
- IT Polysiloxanes, uses
 - RL: DEV (Device component use); USES (Uses)
 - (polyoxyalkylene-, graft; method for fabricating composite electrodes for batteries using liquid polymer electrolytes)
- IT Polyoxyalkylenes, uses
 - RL: DEV (Device component use); USES (Uses)
 - (polysiloxane-, graft; method for fabricating composite electrodes for batteries using liquid polymer electrolytes)
- IT Tin alloy, base
 - RL: DEV (Device component use); USES (Uses)
 - (method for fabricating composite electrodes for batteries using liquid polymer electrolytes)
- IT 78-79-5, Isoprene, uses 10344-93-1, Acrylate, uses 24937-79-9, PvdF
 - RL: MOA (Modifier or additive use); USES (Uses)
 - (binder; method for fabricating composite electrodes for batteries using liquid polymer electrolytes)
- IT 7439-93-2, Lithium, uses 7440-44-0, Carbon, uses 7440-50-8, Copper, uses 7782-42-5, Graphite, uses 12022-46-7, Iron lithium oxide (FeLiO2) 12031-65-1, Lithium nickel oxide (LiNiO2) 12031-95-7, Lithium titanium oxide (Li4Ti5O12) 12057-17-9, Lithium manganese oxide (LiMn2O4) 12190-79-3, Cobalt lithium oxide (CoLiO2) 15365-14-7, Iron lithium phosphate FeLiPO4 25322-68-3D, Polyethylene oxide, reaction product with siloxanes 90076-65-6, Litfsi 128975-24-6, Lithium manganese nickel oxide

limn0.5ni0.5o2 177997-13-6, Aluminum cobalt lithium nickel oxide
 180997-14-2, Cobalt lithium magnesium nickel oxide 182442-97-3, Cobalt
 lithium nickel zinc oxide 244304-20-9, Cobalt lithium nickel titanium
 oxide 244761-29-3, Lithium bis(oxalato)borate 609349-41-9, Cobalt
 lithium manganese nickel oxide (Co0.3LiMn0.3Ni0.3O2) 609349-42-0,
 Lithium manganese nickel oxide (LiMn1.5NiO4) 609349-43-1, Cobalt lithium
 manganese oxide (CoLiMn1.5O4) 609349-44-2, Iron lithium manganese oxide
 (FeLiMn1.5O4)

RL: DEV (Device component use); USES (Uses)
 (method for fabricating composite electrodes for
 batteries using liquid polymer electrolytes)

IT 96-49-1, Ethylene carbonate 108-32-7, Propylene
 carbonate 420-12-2, Ethylene sulfide 823-31-4, Ethyl Ethylene
 phosphate 872-36-6, Vinylene carbonate 4427-96-7, Vinyl
 ethylene carbonate 7446-09-5, Sulfur dioxide, uses

RL: MOA (Modifier or additive use); USES (Uses)
 (method for fabricating composite electrodes for
 batteries using liquid polymer electrolytes)

IT 9003-18-3
 RL: MOA (Modifier or additive use); USES (Uses)
 (nitrile rubber, binder; method for fabricating composite
 electrodes for batteries using liquid polymer
 electrolytes)

IT 68-12-2, Dmf, uses 75-05-8, Acetonitrile, uses 109-99-9, Thf, uses
 127-19-5, Dimethyl acetamide 872-50-4, n-Methylpyrrolidone, uses
 7732-18-5, Water, uses

RL: TEM (Technical or engineered material use); USES (Uses)
 (solvent; method for fabricating composite electrodes for
 batteries using liquid polymer electrolytes)

IT 9003-55-8
 RL: MOA (Modifier or additive use); USES (Uses)
 (styrene-butadiene rubber, binder; method for fabricating composite
 electrodes for batteries using liquid polymer
 electrolytes)

IT 7440-44-0, Carbon, uses 7782-42-5,
 Graphite, uses 15365-14-7, Iron lithium phosphate
 felipo4

RL: DEV (Device component use); USES (Uses)
 (method for fabricating composite electrodes for
 batteries using liquid polymer electrolytes)

RN 7440-44-0 HCAPLUS

CN Carbon (CA INDEX NAME)

C

RN 7782-42-5 HCAPLUS

CN Graphite (CA INDEX NAME)

C

RN 15365-14-7 HCAPLUS

CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

L108 ANSWER 3 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2004:78583 HCAPLUS Full-text

DN 140:114276

TI Battery structures, self-organizing devices and related methods

IN Gozdz, Antoni S.; Holman, Richard K.; Loxley, Andrew; Wilkins, Ronnie

PA Al23 Systems, Inc., USA

SO U.S. Pat. Appl. Publ., 15 pp., Cont.-in-part of U.S. Ser. No. 206,662.

CODEN: USXXCO

DT Patent

LA English

FAN.CNT 5

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 20040018431	A1	20040129	US 2003-354673	20030130 <--
	US 7387851	B2	20080617		
	US 20030099884	A1	20030529	US 2002-206662	20020726 <--
	WO 2004068618	A2	20040812	WO 2004-US2829	20040130
	WO 2004068618	A3	20050407		
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI				
	US 20080311470	A1	20081218	US 2008-140058	20080616 <--
PRAI	US 2001-308360P	P	20010727	<--	
	US 2002-206662	A2	20020726		
	US 2001-21740	A2	20011022	<--	
	US 2003-354673	A	20030130		

AB An electrochem. device includes a first electrode in elec. communication with a first current collector, a second electrode in elec. communication with a second current collector and a crosslinked solid polymer in contact with the first and second electrodes. At least one of the first and second electrodes includes a network of elec. connected particles comprising an electroactive material, and the particles of one electrode exert a repelling force on the other electrode when the first and second electrodes are combined with an uncrosslinked precursor to the solid polymer.

IC ICM H01M0010-08

INCL 429309000; 252062200

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38, 72

ST Battery bipolar self organizing device

IT Polymer electrolytes

Secondary batteries

(battery structures, self-organizing devices and related methods)

IT Polyurethanes, uses

- RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(battery structures, self-organizing devices and related methods)
- IT Fluoropolymers, uses
RL: MOA (Modifier or additive use); USES (Uses)
(battery structures, self-organizing devices and related methods)
- IT Phosphate glasses
RL: DEV (Device component use); USES (Uses)
(borophosphate; battery structures, self-organizing devices and related methods)
- IT Polyethers, uses
RL: DEV (Device component use); USES (Uses)
(crosslinked; battery structures, self-organizing devices and related methods)
- IT Electric apparatus
(electrochem.; battery structures, self-organizing devices and related methods)
- IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(hydroxy-terminated, condensation product with melamine; battery structures, self-organizing devices and related methods)
- IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(hydroxy-terminated, condensation product with phenolics.; battery structures, self-organizing devices and related methods)
- IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(hydroxy-terminated, reaction product with polyisocyanates; battery structures, self-organizing devices and related methods)
- IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(vinyl-terminated, hydrosilation product with compds. containing multiple Si-H bonds; battery structures, self-organizing devices and related methods)
- IT 7439-95-4, Magnesium, uses
RL: MOA (Modifier or additive use); USES (Uses)
(LiCoO₂ doped with; battery structures, self-organizing devices and related methods)
- IT 7429-90-5, Aluminum, uses
RL: MOA (Modifier or additive use); USES (Uses)
(LiMnO₂ doped with; battery structures, self-organizing devices and related methods)
- IT 1307-96-6, Cobalt monoxide, uses 1313-13-9, Manganese dioxide, uses 1313-99-1, Nickel monoxide, uses 1314-62-1, Vanadium pentoxide, uses 1317-34-6, Manganese oxide Mn₂O₃ 1317-35-7, Manganese oxide Mn₃O₄ 1344-43-0, Manganese monoxide, uses 1345-25-1, Iron monoxide, uses 7439-93-2, Lithium, uses 7439-93-2D, Lithium, intercalation compound 7440-21-3, Silicon, uses 7440-22-4, Silver, uses 7440-31-5, Tin, uses 7440-36-0, Antimony, uses 7440-42-8, Boron, uses 7440-44-8, Carbon, uses 7440-56-4, Germanium, uses 7440-66-6, Zinc, uses 7440-69-9, Bismuth, uses 7782-42-5, Graphite, uses 11126-15-1, Lithium vanadium oxide 12002-78-7 12031-65-1, Lithium nickel oxide LiNiO₂ 12037-30-8, Vanadium oxide V₆O₁₁ 12042-37-4, AlLi 12048-27-0, BiLi 12057-17-9, Lithium manganese oxide LiMn₂O₄ 12057-22-6, LiZn 12057-30-6 12057-33-9 12063-07-9, Iron lithium

oxide fe2lio4 12162-79-7, Lithium manganese oxide limno2 12190-79-3, Cobalt lithium oxide colio2 12253-44-0 12338-02-2 13463-67-7, Titania, uses 13826-59-0, Lithium manganese phosphate limpo4 15365-14-7, Iron lithium phosphate felipo4 18282-10-5, Tin dioxide 21651-19-4, Tin monoxide 25322-68-3D, Polyethylene glycol, hydroxy-terminated, condensation product with melamine 25322-68-3D, Polyethylene glycol, hydroxy-terminated, condensation product with phenolics. 25322-68-3D, Polyethylene glycol, hydroxy-terminated, reaction product with polyisocyanates 25322-68-3D, Polyethylene glycol, vinyl-terminated, hydrosilation product with compds. containing multiple Si-H bonds 25721-76-0, Polyethylene glycol dimethacrylate 25736-86-1, Polyethylene glycol methacrylate 26403-58-7, Polyethylene glycol acrylate 26570-48-9, Polyethylene glycol diacrylate 26915-72-0, Methoxy polyethylene glycol methacrylate 37217-08-6, Lithium titanium oxide liti2o4 53262-48-9 55575-96-7, Lithium silicide Li13Si4 55608-41-8 56627-44-2 61812-08-6, Lithium silicide Li21Si8 66403-10-9, Lithium boride li5b4 67070-82-0 71012-86-7, Lithium boride li7b6 74083-26-4 76036-33-4, Lithium silicide Li12Si7 90076-65-6 106494-93-3, Lithium silicide Li21Si5 114778-10-8, Iron lithium sulfate fe2li2(SO4)3 496816-56-9

RL: DEV (Device component use); USES (Uses)

(battery structures, self-organizing devices and related methods)

IT 9002-84-0, Ptfе 155090-83-8, Baytron PH 180049-13-2, Aluminum boride nitride albn

RL: MOA (Modifier or additive use); USES (Uses)

(battery structures, self-organizing devices and related methods)

IT 7449-44-0, Carbon, uses 7782-42-5,

Graphite, uses 13826-59-0, Lithium manganese phosphate limpo4 15365-14-7, Iron lithium phosphate felipo4

114778-10-8, Iron lithium sulfate fe2li2(SO4)3

RL: DEV (Device component use); USES (Uses)

(battery structures, self-organizing devices and related methods)

RN 7440-44-0 HCAPLUS

CN Carbon (CA INDEX NAME)

c

RN 7782-42-5 HCAPLUS

CN Graphite (CA INDEX NAME)

c

RN 13826-59-0 HCAPLUS

CN Phosphoric acid, lithium manganese(2+) salt (1:1:1) (9CI) (CA INDEX NAME)



● Li

● Mn(II)

RN 15365-14-7 HCAPLUS

CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

RN 114778-10-8 HCAPLUS

CN Sulfuric acid, iron(2+) lithium salt (3:2:2) (9CI) (CA INDEX NAME)



●2/3 Fe(II)

●2/3 Li

RE.CNT 146 THERE ARE 146 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 4 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2004:321i HCAPLUS [Full-text](#)

DN 140:44760

TI Process for production of carbon-coated
lithium-containing powders for lithium secondary battery

IN Audemer, Aibane; Worm, Cécile; Morcrette,
Mathieu; Gwizdala, Sylvain; Masquellier, Christian

PA Ghilore, Belg.; Le Centre National de la Recherche Scientifique

SO PCT Int. Appl., 18 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2004001881	A2	20031231	WO 2003-EP6628	20030619 <--
	WO 2004001881	A3	20041229		
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW			
	RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			
	CA 2490091	A1	20031231	CA 2003-2490091	20030619 <--
	AU 2003250847	A1	20040106	AU 2003-250847	20030619 <--
	EP 1518284	A2	20050330	EP 2003-760688	20030619 <--
	R:	AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK			
	CN 1663064	A	20050831	CN 2003-814563	20030619 <--
	CN 100379062	C	20080402		
	JP 2005530676	T	20051013	JP 2004-530900	20030619 <--
	US 20060035150	A1	20060216	US 2005-518560	20050831 <--
PRAI	EP 2002-291562	A	20020621	<--	
	US 2002-392978P	P	20020702		
	WO 2003-EP6628	W	20030619	<--	

AB The invention provides a new route for the synthesis of carbon-coated powders having the olivine or NASICON structure, which form promising classes of active products for the manufacture of rechargeable lithium batteries. Carbon-coating of the powder particles is necessary to achieve good performances because of the rather poor electronic conductivity of the structures. For the preparation of coated LiFePO₄, sources of Li, Fe and phosphate are dissolved in an aqueous solution together with a polycarboxylic acid and a polyhydric alc. Upon water evaporation, polyesterification occurs while a mixed precipitate is formed containing Li, Fe and phosphate. The resin-encapsulated mixture is then heat treated at 700° in a reducing atmospheric. This results in the production of a fine powder consisting of an olivine LiFePO₄ phase, coated with conductive carbon. When this powder is used as active material in a lithium insertion-type electrode, fast charge and discharge rates are obtained at room temperature and an excellent capacity retention is observed

IC ICM H01M0004-58

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST battery carbon coated lithium contg powder prepn

IT Olivine-group minerals

RL: DEV (Device component use); USES (Uses)
 (lithium-containing; process for production of carbon-coated lithium-containing powders for lithium secondary battery)

IT Secondary batteries
 (lithium; process for production of carbon-coated lithium-containing powders for lithium secondary battery)

IT Carboxylic acids, uses

RL: DEV (Device component use); USES (Uses)

(polycarboxylic; process for production of carbon-coated lithium-containing powders for lithium secondary battery)

IT Polymerization
(polyesterification; process for production of carbon-coated lithium-containing powders for lithium secondary battery)

IT Alcohols, uses
RL: DEV (Device component use); USES (Uses)
(polyhydric; process for production of carbon-coated lithium-containing powders for lithium secondary battery)

IT Battery cathodes
(process for production of carbon-coated lithium-containing powders for lithium secondary battery)

IT 77641-62-4, Nasicon
RL: DEV (Device component use); USES (Uses)
(lithium-containing; process for production of carbon-coated lithium-containing powders for lithium secondary battery)

IT 10421-48-4, Ferric nitrate 13453-80-0, Lithium dihydrogen phosphate
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(process for production of carbon-coated lithium-containing powders for lithium secondary battery)

IT 77-92-9, Citric acid, uses 107-21-1, Ethylene glycol, uses
RL: DEV (Device component use); USES (Uses)
(process for production of carbon-coated lithium-containing powders for lithium secondary battery)

IT 15365-14-7P, Iron lithium phosphate felipo4
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(process for production of carbon-coated lithium-containing powders for lithium secondary battery)

IT 7440-44-0, Carbon, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(process for production of carbon-coated lithium-containing powders for lithium secondary battery)

IT 77641-62-4, Nasicon
RL: DEV (Device component use); USES (Uses)
(lithium-containing; process for production of carbon-coated lithium-containing powders for lithium secondary battery)

RN 77641-62-4 HCAPLUS
CN Nasicon (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IT 10421-48-4, Ferric nitrate 13453-80-0, Lithium dihydrogen phosphate
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(process for production of carbon-coated lithium-containing powders for lithium secondary battery)

RN 10421-48-4 HCAPLUS
CN Nitric acid, iron(3+) salt (3:1) (CA INDEX NAME)



● 1/3 Fe(III)

RN 13453-80-0 HCAPLUS

CN Phosphoric acid, lithium salt (1:1) (CA INDEX NAME)



● Li

IT 77-92-9, Citric acid, uses 107-21-1,

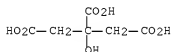
Ethylene glycol, uses

RL: DEV (Device component use); USES (Uses)

(process for production of carbon-coated lithium-containing powders for lithium secondary battery)

RN 77-92-9 HCAPLUS

CN 1,2,3-Propanetricarboxylic acid, 2-hydroxy- (CA INDEX NAME)



RN 107-21-1 HCAPLUS

CN 1,2-Ethanediol (CA INDEX NAME)



IT 15365-14-7P, Iron lithium phosphate felipo4

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(process for production of carbon-coated lithium-containing powders for lithium secondary battery)

RN 15365-14-7 HCAPLUS

CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

IT 7440-44-0, Carbon, uses
 RL: TEM (Technical or engineered material use); USES (Uses)
 (process for production of carbon-coated lithium-containing
 powders for lithium secondary battery)
 RN 7440-44-0 HCAPLUS
 CN Carbon (CA INDEX NAME)

c

RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 5 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2003:930046 HCAPLUS Full-text

DN 139:398032

TI Nonaqueous electrolyte secondary batteries and
 electric apparatus equipped with such batteries

IN Kita, Akinori; Kojima, Hideaki; Segawa, Takeshi; Yamaguchi, Akira

PA Sony Corp., Japan

SO Jpn. Kokai Tokkyo Koho, 11 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2003338277	A	20031128	JP 2002-144834	20020520 <--
PRAI	JP 2002-144834		20020520		

AB The cathode of the battery comprises a mixed oxide containing Li and transition metal and is equipped with a thin layer of conductive carbonaceous material and a binder. Also claimed is a battery with a cathode having a thin layer characterized by maximum peak intensity at 530-535 eV, in the 1st inner shell quasi-spectra determined by XPS under photon emission angle of $\leq 35^\circ$, being larger than that for 1st inner shell quasi-spectra of O in 528-530 eV. Preferable compds. for use as solvents are also given. Also claimed are nonaq. secondary batteries prepared under application of pulsed voltage after assembly and elec. apparatus equipped with such batteries. The batteries show prevented short circuit and smoke generation.

ICM H01M0004-02

ICS H01M0004-58; H01M0004-62; H01M0010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST nonaq electrolyte secondary battery mixed oxide
 cathode; lithium transition metal oxide battery

cathode; thin coating cathode secondary
battery; short circuit prevention cathode secondary
battery

IT Fluoropolymers, uses

RL: DEV (Device component use); USES (Uses)
(binder for conductive coating on cathodes; nonaq.
electrolyte secondary batteries with lithium
transition metal oxide cathodes having thin
carbonaceous coatings)

IT Films

(elec. conductive, cathode surface coated with;
nonaq. electrolyte secondary batteries with lithium
transition metal oxide cathodes having thin
carbonaceous coatings)

IT Electric conductors

(films, cathode surface coated with; nonaq.
electrolyte secondary batteries with lithium
transition metal oxide cathodes having thin
carbonaceous coatings)

IT Transition metal oxides

RL: DEV (Device component use); USES (Uses)
(lithium-containing, cathodes; nonaq. electrolyte
secondary batteries with lithium transition metal oxide
cathodes having thin carbonaceous coatings)

IT Battery cathodes

Secondary batteries
(nonaq. electrolyte secondary batteries with
lithium transition metal oxide cathodes having thin
carbonaceous coatings)

IT Carbonaceous materials (technological products)

RL: DEV (Device component use); USES (Uses)
(nonaq. electrolyte secondary batteries with
lithium transition metal oxide cathodes having thin
carbonaceous coatings)

IT 24937-79-9, Poly(vinylidene fluoride)

RL: DEV (Device component use); USES (Uses)
(binder for conductive coating on cathodes; nonaq.
electrolyte secondary batteries with lithium
transition metal oxide cathodes having thin
carbonaceous coatings)

IT 12057-17-9, Lithium manganese oxide (LiMn2O4) 12190-79-3, Cobalt lithium
oxide (CoLiO2) 15365-14-7, Iron lithium phosphate (FeLiPO4)

RL: DEV (Device component use); USES (Uses)
(cathode active materials; nonaq. electrolyte
secondary batteries with lithium transition metal oxide
cathodes having thin carbonaceous coatings)

IT 7782-44-7, Oxygen, uses

RL: DEV (Device component use); USES (Uses)
(conductive carbonaceous coatings containing; nonaq.
electrolyte secondary batteries with lithium
transition metal oxide cathodes having thin
carbonaceous coatings)

IT 7440-44-8, Carbon, uses

RL: DEV (Device component use); USES (Uses)
(conductive coating on cathodes; nonaq.
electrolyte secondary batteries with lithium
transition metal oxide cathodes having thin
carbonaceous coatings)

IT 7782-42-5, Graphite, uses

RL: DEV (Device component use); USES (Uses)

(nonaq. electrolyte secondary batteries with lithium transition metal oxide cathodes having thin carbonaceous coatings)

- IT 79-20-9, Methyl acetate 96-48-0, γ -Butyrolactone 96-49-1, Ethylene carbonate 102-09-0, Diphenyl carbonate 105-54-4, Ethyl butyrate 105-58-8, Diethyl carbonate 108-29-2, γ -Valerolactone 108-32-7, Propylene carbonate 109-60-4, n-Propyl acetate 123-86-4, Butyl acetate 140-11-4, Benzyl acetate 141-78-6, Acetic ether, uses 517-23-7, α -Acetyl- γ -butyrolactone 540-42-1, Isobutyl propionate 554-12-1, Methyl propionate 616-38-6, Dimethyl carbonate 623-53-0, Ethyl methyl carbonate 872-36-6, Vinylene carbonate 1609-47-8, Diethyl dicarbonate 1679-47-6, α -Methyl- γ -butyrolactone 2171-74-6, 1,3-Benzodioxol-2-one 3967-54-2, Chloroethylene carbonate 4427-92-3, Phenylethylene carbonate 4427-96-7, Vinyl ethylene carbonate 16761-08-3 21240-34-6 122036-85-5 324547-56-0 625365-63-1
- RL: DEV (Device component use); USES (Uses)
(nonaq. electrolyte solvent; nonaq. electrolyte secondary batteries with lithium transition metal oxide cathodes having thin carbonaceous coatings)
- IT 21324-40-3, Lithium hexafluorophosphate
RL: DEV (Device component use); USES (Uses)
(nonaq. electrolyte; nonaq. electrolyte secondary batteries with lithium transition metal oxide cathodes having thin carbonaceous coatings)
- IT 15365-14-7, Iron lithium phosphate (FeLiPO₄)
RL: DEV (Device component use); USES (Uses)
(cathode active materials; nonaq. electrolyte secondary batteries with lithium transition metal oxide cathodes having thin carbonaceous coatings)
- RN 15365-14-7 HCAPLUS
- CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

- IT 7440-44-0, Carbon, uses
RL: DEV (Device component use); USES (Uses)
(conductive coating on cathodes; nonaq. electrolyte secondary batteries with lithium transition metal oxide cathodes having thin carbonaceous coatings)
- RN 7440-44-0 HCAPLUS
- CN Carbon (CA INDEX NAME)

C

IT 7782-42-5, Graphite, uses
 RL: DEV (Device component use); USES (Uses)
 (nonaq. electrolyte secondary batteries with
 lithium transition metal oxide cathodes having thin
 carbonaceous coatings)
 RN 7782-42-5 HCAPLUS
 CN Graphite (CA INDEX NAME)

C

L108 ANSWER 6 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2003:890285 HCAPLUS Full-text

DN 139:367565

TI Production method of cathode material containing iron lithium
 phosphate and conductive particles for secondary battery and
 nonaqueous type secondary battery therewith

IN Higuchi, Shoji; Wada, Mitsuhsu; Doi, Motoyuki; Kinoshita, Hajime; Yada,
 Shizukuni

PA Kansai Research Institute Inc., Japan

SO Jpn. Kokai Tokkyo Koho, 6 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2003323892	A	20031114	JP 2002-128958	20020430 <--
PRAI	JP 2002-128958		20020430 <--		

AB The cathode material containing LiFePO₄ and conductive particles is
 manufactured by mixing a Li compound, an Fe(II) compound, and a phosphate
 together with a polar solvent and inert gas in an airtight container and
 reacting at 100-250°, wherein conductive particles are mixed in the reaction
 solution. The conductive particles are metal particles, C isotope or
 conductive polymer particles. Secondary battery provided with cathode from
 the cathode material has high discharge capacity and extremely stable
 discharge voltage.

IC ICM H01M0004-58

ICS C01B0025-45; H01M0004-04; H01M0004-62; H01M0010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST iron lithium phosphate conductive particle battery

cathode secondary battery

IT Battery cathodes

Conducting polymers

(production method of cathode material containing iron lithium
 phosphate and conductive particles for secondary battery and
 nonaq. type secondary battery therewith)

IT Carbon black, uses

Metals, uses

Polyanilines

RL: TEM (Technical or engineered material use); USES (Uses)

(production method of cathode material containing iron lithium
 phosphate and conductive particles for secondary battery and

nonaq. type secondary battery therewith)
 IT 7440-44-0, Carbon, uses
 RL: TEM (Technical or engineered material use); USES (Uses)
 (isotope; production method of cathode material containing iron
 lithium phosphate and conductive particles for secondary
 battery and nonaq. type secondary battery therewith)
 IT 7440-22-4, Silver, uses 15365-14-7, Iron lithium phosphate
 (FeLiPO4)
 RL: TEM (Technical or engineered material use); USES (Uses)
 (production method of cathode material containing iron lithium
 phosphate and conductive particles for secondary battery and
 nonaq. type secondary battery therewith)
 IT 7440-44-0, Carbon, uses
 RL: TEM (Technical or engineered material use); USES (Uses)
 (isotope; production method of cathode material containing iron
 lithium phosphate and conductive particles for secondary
 battery and nonaq. type secondary battery therewith)
 RN 7440-44-0 HCAPLUS
 CN Carbon (CA INDEX NAME)

C

IT 15365-14-7, Iron lithium phosphate (FeLiPO4)
 RL: TEM (Technical or engineered material use); USES (Uses)
 (production method of cathode material containing iron lithium
 phosphate and conductive particles for secondary battery and
 nonaq. type secondary battery therewith)
 RN 15365-14-7 HCAPLUS
 CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

L108 ANSWER 7 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN
 AN 2003:797069 HCAPLUS Full-text
 DN 139:294689
 TI Method for fabricating composite electrodes for
 batteries and capacitors
 IN Yoon, Sang Young; Oh, Bookeun; Amine, Khalil
 PA Quallion LLC, USA
 SO PCT Int. Appl., 25 pp.
 CODEN: PIXXD2
 DT Patent
 LA English

FAN.CNT 14

PATENT NO.		KIND	DATE	APPLICATION NO.	DATE
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PI	WO 2003083974	A1	20031009	WO 2003-US8783	20030320 <--
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
	RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	US 20030180624	A1	20030925	US 2002-104352	20020322 <--
	US 20030180625	A1	20030925	US 2002-167940	20020612 <--
	WO 2003083970	A1	20031009	WO 2003-US2127	20030122 <--
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
	RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	WO 2003083971	A1	20031009	WO 2003-US2128	20030122 <--
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
	RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	AU 2003218329	A1	20031013	AU 2003-218329	20030320 <--
	US 20040248014	A1	20041209	US 2004-810081	20040325
	US 20050019656	A1	20050127	US 2004-496231	20040520 <--
	US 20050106470	A1	20050519	US 2004-962125	20041007
	US 20070065728	A1	20070322	US 2006-346087	20060202 <--
PRAI	US 2002-104352	A	20020322	<--	
	US 2002-167940	A	20020612	<--	
	WO 2003-US2127	A	20030122		
	WO 2003-US2128	A	20030122		
	US 2003-443892P	P	20030130		
	US 2003-446848P	P	20030211		
	US 2003-451065P	P	20030226		
	US 2002-72739	B2	20020208	<--	
	WO 2003-US8783	W	20030320		
	US 2003-502017P	P	20030910		
	US 2004-542017P	P	20040204		
	US 2004-543898P	P	20040211		
	US 2004-543951P	P	20040211		
	US 2004-810019	A2	20040325		
	US 2004-810080	A2	20040325		
	US 2004-810081	A2	20040325		
	US 2004-563848P	P	20040419		

US	2004-563849P	P	20040419
US	2004-563850P	P	20040419
US	2004-563852P	P	20040419
US	2004-565211P	P	20040422
US	2004-496231	A2	20040520
US	2004-601452P	P	20040813
US	2004-962125	A2	20041007
US	2004-971912	A2	20041021
US	2005-53338	A2	20050208
US	2005-56866	A2	20050210
US	2005-56867	A2	20050210
US	2005-56868	A2	20050210
US	2005-56869	A2	20050210
US	2005-668878P	P	20050405
US	2005-211970	A2	20050824
US	2005-271473	A2	20051110
US	2005-272261	A2	20051110

AB Disclosed is a method for manufacturing electrodes for electrochem. devices such as batteries and capacitors in which a viscous polysiloxane polymer electrolyte is incorporated into the slurry of materials forming the electrode. The optional addition of protective additives to the slurry is also disclosed. A follow-on vacuum impregnation step is disclosed to further improve penetration and wetting by the electrolyte.

IC ICM H01M0006-14
ICS H01M0006-16; H01M0006-18; H01M0004-58; H01M0004-60; H01M0004-62

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 76

ST battery composite electrode fabrication; capacitor composite electrode fabrication

IT Crystal whiskers
(graphite; method for fabricating composite electrodes for batteries and capacitors)

IT Secondary batteries
(lithium; method for fabricating composite electrodes for batteries and capacitors)

IT Battery electrodes
Capacitor electrodes
Capacitors
(method for fabricating composite electrodes for batteries and capacitors)

IT Polysiloxanes, uses
RL: DEV (Device component use); USES (Uses)
(method for fabricating composite electrodes for batteries and capacitors)

IT Acrylic polymers, uses
RL: MOA (Modifier or additive use); USES (Uses)
(method for fabricating composite electrodes for batteries and capacitors)

IT Carbon black, uses
RL: MOA (Modifier or additive use); USES (Uses)
(method for fabricating composite electrodes for batteries and capacitors)

IT Fluoropolymers, uses
RL: MOA (Modifier or additive use); USES (Uses)
(method for fabricating composite electrodes for batteries and capacitors)

IT Isoprene rubber, uses
RL: MOA (Modifier or additive use); USES (Uses)
(method for fabricating composite electrodes for batteries and capacitors)

- IT Metallic fibers
RL: MOA (Modifier or additive use); USES (Uses)
(method for fabricating composite electrodes for batteries and capacitors)
- IT Natural rubber, uses
RL: MOA (Modifier or additive use); USES (Uses)
(method for fabricating composite electrodes for batteries and capacitors)
- IT Nitrile rubber, uses
RL: MOA (Modifier or additive use); USES (Uses)
(method for fabricating composite electrodes for batteries and capacitors)
- IT Styrene-butadiene rubber, uses
RL: MOA (Modifier or additive use); USES (Uses)
(method for fabricating composite electrodes for batteries and capacitors)
- IT Tin alloy, base
RL: DEV (Device component use); USES (Uses)
(method for fabricating composite electrodes for batteries and capacitors)
- IT 9003-31-0
RL: MOA (Modifier or additive use); USES (Uses)
(isoprene rubber, method for fabricating composite electrodes for batteries and capacitors)
- IT 7439-93-2, Lithium, uses 7440-44-0, Carbon, uses 7782-42-5, Graphite, uses 12022-46-7, Iron lithium oxide felio2 12031-65-1, Lithium nickel oxide linio2 12031-95-7, Lithium titanium oxide Li4Ti5O12 12057-17-9, Lithium manganese oxide limn2o4 12190-79-3, Cobalt lithium oxide colio2 15365-14-7, Iron lithium phosphate felipo4 128975-24-6, Lithium manganese nickel oxide LiMn0.5Ni0.5O2 177997-13-6, Aluminum Cobalt lithium nickel oxide 180997-14-2, Cobalt lithium magnesium nickel oxide 182442-97-3, Cobalt lithium nickel zinc oxide 244304-20-9, Cobalt lithium nickel titanium oxide 609349-41-9, Cobalt lithium manganese nickel oxide (Co0.3LiMn0.3Ni0.3O2) 609349-42-0, Lithium manganese nickel oxide (LiMn1.5NiO4) 609349-43-1, Cobalt lithium manganese oxide (CoLiMn1.5O4) 609349-44-2, Iron lithium manganese oxide (FeLiMn1.5O4)
RL: DEV (Device component use); USES (Uses)
(method for fabricating composite electrodes for batteries and capacitors)
- IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate 420-12-2, Ethylene sulfide 823-31-4 872-36-6, Vinylene carbonate 4427-96-7, Vinyl ethylene carbonate 7446-09-5, Sulfur dioxide, uses 24937-79-9, PvdF
RL: MOA (Modifier or additive use); USES (Uses)
(method for fabricating composite electrodes for batteries and capacitors)
- IT 68-12-2, Dmf, uses 75-05-8, Acetonitrile, uses 109-99-9, Thf, uses 127-19-5, Dimethyl acetamide 872-50-4, n-Methylpyrrolidone, uses 7732-18-5, Water, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(method for fabricating composite electrodes for batteries and capacitors)
- IT 9003-18-3
RL: MOA (Modifier or additive use); USES (Uses)
(nitrile rubber, method for fabricating composite electrodes for batteries and capacitors)
- IT 9003-55-8
RL: MOA (Modifier or additive use); USES (Uses)
(styrene-butadiene rubber, method for fabricating composite

electrodes for batteries and capacitors)
 IT 7440-44-0, Carbon, uses 7782-42-5,
 Graphite, uses 15365-14-7, Iron lithium phosphate
 felipo4
 RL: DEV (Device component use); USES (Uses)
 (method for fabricating composite electrodes for
 batteries and capacitors)
 RN 7440-44-0 HCAPLUS
 CN Carbon (CA INDEX NAME)

C

RN 7782-42-5 HCAPLUS
 CN Graphite (CA INDEX NAME)

C

RN 15365-14-7 HCAPLUS
 CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

RE.CNT 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 8 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN
 AN 2003:657067 HCAPLUS Full-text
 DN 139:167004
 TI Manufacture of cathode active mass and secondary nonaqueous
 electrolyte battery
 IN Okawa, Tsuyoshi; Fukushima, Yuzuru
 PA Sony Corporation, Japan
 SO PCT Int. Appl., 21 pp.
 CODEN: PIXXD2
 DT Patent
 LA Japanese
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2003069701	A1	20030821	WO 2003-JP1192	20030205 <--
	W: CN, KR, US				

RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE,
IT, LU, MC, NL, PT, SE, SI, SK, TR

JP 2003242974 A 20030829 JP 2002-37200 20020214 <--
JP 4207434 B2 20090114
EP 1489672 A1 20041222 EP 2003-703192 20030205 <--

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,
IE, SI, FI, CY, TR, BG, CZ, EE, HU, SK

CN 1714464 A 20051228 CN 2003-800206 20030205 <--
US 20040111873 A1 20040617 US 2003-473014 20030926 <--

PRAI JP 2002-37200 A 20020214 <--
WO 2003-JP1192 W 20030205

AB The active mass, represented by a composition $\text{Li}_x\text{Fe}_y\text{M}_y\text{PO}_4$ ($\text{M} = \text{Mn, Cr, Co, Cu, Ni, V, Mo, Ti, Zn, Al, Ga, Mg, B, and/or Nb}$; $x = 0.05-1.2$; $0 \leq y < 0.8$), is prepared by mixing $\text{Fe}_3(\text{PO}_4)_2 \cdot n \text{H}_2\text{O}$ ($n = \text{hydration number } 0-8$) with Li_3PO_4 , and firing the raw material mixture; where the mixture has a half width of the maximum peak $\leq 1.0^\circ$ by $\text{CuK}\alpha$ X-ray diffraction spectrum. The battery, having a cathode containing the above cathode active mass, an anode containing an anode active mass, and a nonaq. electrolyte, is manufactured by preparing the above required cathode active mass.

IC ICM H01M0004-58
ICS H01M0004-02; H01M0010-40; C01B0025-45

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary battery cathode lithium iron phosphate manuf

IT 7439-93-2, Lithium, uses 7782-42-5, Graphite, uses
RL: DEV (Device component use); USES (Uses)
(anode; manufacture of cathode active mass containing lithium iron phosphates for secondary lithium batteries)

IT 15365-14-7P, Iron lithium phosphate (FeLiPO_4)
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(cathode active mass; manufacture of cathode active mass containing lithium iron phosphates for secondary lithium batteries)

IT 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 21324-40-3, Lithium hexafluorophosphate
RL: DEV (Device component use); USES (Uses)
(electrolyte; manufacture of cathode active mass containing lithium iron phosphates for secondary lithium batteries)

IT 10028-23-6, Ferrous phosphate octahydrate 10377-52-3, Lithium phosphate (Li_3PO_4)
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(manufacture of cathode active mass containing lithium iron phosphates for secondary lithium batteries)

IT 7782-42-5, Graphite, uses
RL: DEV (Device component use); USES (Uses)
(anode; manufacture of cathode active mass containing lithium iron phosphates for secondary lithium batteries)

RN 7782-42-5 HCAPLUS
CN Graphite (CA INDEX NAME)

c

IT 15365-14-7P, Iron lithium phosphate (FeLiPO_4)
RL: DEV (Device component use); IMF (Industrial manufacture); PREP

(Preparation); USES (Uses)
 (cathode active mass; manufacture of cathode active mass
 containing lithium iron phosphates for secondary lithium batteries
)

RN 15365-14-7 HCAPLUS

CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

IT 10377-52-3, Lithium phosphate (Li3PO4)

RL: CPS (Chemical process); PEP (Physical, engineering or chemical
 process); PROC (Process)
 (manufacture of cathode active mass containing lithium iron phosphates
 for secondary lithium batteries)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 9 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2003:413937 HCAPLUS Full-text

DN 138:404345

TI Battery structures, self-organizing structures and related
 methods

IN Chiang, Yet Ming; Moorehead, William Douglas; Gozdz, Antoni S.; Holman,
 Richard K.; Loxley, Andrew; Riley, Gilbert N.; Viola, Michael S.

PA Al23systems, Inc., USA

SO U.S. Pat. Appl. Publ., 70 pp., Cont.-in-part of U.S. Ser. No. 21,740.

CODEN: USXXCO

DT Patent

LA English

FAN.CNT 5

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 20030099884	A1	20030529	US 2002-206662	20020726 <--
	US 20030082446	A1	20030501	US 2001-21740	20011022 <--

	US 20040018431	A1	20040129	US 2003-354673	20030130 <--
	US 7387851	B2	20080617		
	US 20050272214	A1	20051208	US 2005-108602	20050418 <--
	US 20080311470	A1	20081218	US 2008-140058	20080616 <--
PRAI	US 2001-308360P	P	20010727	<--	
	US 2001-21740	A2	20011022	<--	
	US 2000-242124P	P	20001020	<--	
	US 2002-206662	A2	20020726		
	US 2003-354673	A3	20030130		
	US 2004-563026P	P	20040416		
	US 2004-583850P	P	20040629		
AB	An energy storage device includes a first electrode comprising a first material and a second electrode comprising a second material, at least a portion of the first and second materials forming an interpenetrating network when dispersed in an electrolyte, the electrolyte, the first material and the second material are selected so that the first and second materials exert a repelling force on each other when combined. An electrochem. device, includes a first electrode in elec. communication with a first current collector; a second electrode in elec. communication with a second current collector; and an ionically conductive medium in ionic contact with the first and second electrodes, wherein at least a portion of the first and second electrodes form an interpenetrating network and wherein at least one of the first and second electrodes comprises an electrode structure providing two or more pathways to its current collector.				
IC	ICM H01M0004-64				
	ICS H01M0004-80; H01M0004-58				
INCL	429233000; 429235000; 429231950; 429212000; 429231400; 429210000				
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology)				
ST	battery self organizing structure				
IT	Battery anodes				
	Battery cathodes				
	Coating process				
	Embossing				
	(battery structures, self-organizing structures and related methods)				
IT	Fluoropolymers, uses				
	Glass, uses				
	Polyamines				
	Polyimides, uses				
	Polyoxyalkylenes, uses				
	RL: DEV (Device component use); USES (Uses)				
	(battery structures, self-organizing structures and related methods)				
IT	Polymers, uses				
	RL: DEV (Device component use); USES (Uses)				
	(block, Li salt-doped; battery structures, self-organizing structures and related methods)				
IT	Primary batteries				
	(lithium; battery structures, self-organizing structures and related methods)				
IT	Intercalation compounds				
	RL: DEV (Device component use); USES (Uses)				
	(lithium; battery structures, self-organizing structures and related methods)				
IT	Azines				
	Group VA element compounds				
	RL: DEV (Device component use); USES (Uses)				
	(phosphazines; battery structures, self-organizing structures and related methods)				
IT	7439-95-4, Magnesium, uses				

RL: MOA (Modifier or additive use); USES (Uses)
 (ColiO2 doped with; battery structures, self-organizing structures and related methods)

IT 7440-03-1, Niobium, uses 7440-25-7, Tantalum, uses 7440-32-6, Titanium, uses 7440-33-7, Tungsten, uses 12042-37-4, All
 RL: MOA (Modifier or additive use); USES (Uses)
 (LiFePO4 doped with; battery structures, self-organizing structures and related methods)

IT 7429-90-5, Aluminum, uses
 RL: MOA (Modifier or additive use); USES (Uses)
 (LiMnO2 doped with; battery structures, self-organizing structures and related methods)

IT 68-12-2, Dmf, uses 75-11-6, Diiodomethane 96-49-1, Ethylene carbonate 105-58-8, DiEthyl carbonate 108-32-7, Propylene carbonate 616-38-6, DimEthyl carbonate 627-31-6, 1,3-Diiodopropane 1307-96-6, Cobalt monoxide, uses 1313-13-9, Manganese dioxide, uses 1313-99-1, Nickel oxide (NiO), uses 1314-62-1, Vanadia, uses 1317-34-6, Manganese oxide mn2o3 1317-35-7, Manganese oxide mn3o4 1335-25-7, Lead oxide 1343-98-2, Silicon hydroxide 1344-43-0, Manganese oxide mno, uses 1345-25-1, Iron oxide feo, uses 7226-23-5 7439-93-2, Lithium, uses 7439-93-2D, Lithium, intercalation compound 7440-21-3, Silicon, uses 7440-22-4, Silver, uses 7440-31-5, Tin, uses 7440-36-0, Antimony, uses 7440-42-8, Boron, uses 7440-44-0, Carbon, uses 7440-56-4, Germanium, uses 7440-66-6, Zinc, uses 7440-69-9, Bismuth, uses 7631-86-9, Silicon oxide, uses 7782-42-5, Graphite, uses 9003-53-6, Polystyrene 10043-35-3, Boric acid (H3BO3), uses 10361-43-0, Bismuth hydroxide 12002-78-7 12031-65-1, Lithium nickel oxide linio2 12037-30-8, Vanadium oxide v6o11 12048-27-0, Bili 12057-17-9, Lithium manganese oxide limn2o4 12057-22-6, LiZn 12057-30-6 12057-33-9 12063-07-9, Iron lithium oxide fe2lio4 12162-79-7, Lithium manganese oxide linmo2 12190-79-3, Cobalt lithium oxide colio2 12253-44-0 12338-02-2 12651-23-9, Titanium hydroxide 13463-67-7, Titanium oxide, uses 14475-63-9, Zirconium hydroxide Zr(OH)4 15365-14-7, Iron lithium phosphate Felipe4 18282-10-5, Tin dioxide 21651-19-4, Tin oxide sno 24937-79-9, Polyvinylidene fluoride 25014-41-9, Polyacrylonitrile 25322-68-3, Peo 25322-69-4, Polypropylene oxide 37217-08-6, Lithium titanium oxide liti2o4 39345-91-0, Lead hydroxide 53262-48-9 55575-96-7, Lithium silicide Li13Si4 55608-41-8 56627-44-2 61812-08-6, Lithium silicide Li21Si8 66403-10-9, Lithium boride Li5B4 67070-82-0 71012-86-7, Lithium boride Li7B6 74083-26-4 76036-33-4, Lithium silicide Li12Si7 106494-93-3, Lithium silicide Li21Si5 114778-10-8, Iron lithium sulfate Fe2Li2(SO4)3 144419-56-7, Cobalt lithium magnesium oxide Co0.95LiMg0.05O2 496816-56-9 496816-58-1, Iron lithium zirconium phosphate Fe0.98LiZr0.02(PO4) 531493-25-1, Iron lithium titanium phosphate (Fe0.98LiTi0.02(PO4))
 RL: DEV (Device component use); USES (Uses)
 (battery structures, self-organizing structures and related methods)

IT 99742-70-8, Poly(o-methoxyaniline) 104934-51-2, Poly(3-octylthiophene)
 RL: MOA (Modifier or additive use); USES (Uses)
 (battery structures, self-organizing structures and related methods)

IT 1303-86-2, Boron oxide (B2O3), uses 1304-76-3, Bismuth oxide (Bi2O3), uses 1314-23-4, Zirconium oxide, uses 1314-56-3, Phosphorus oxide (P2O5), uses 1317-36-8, Lead oxide (PbO), uses 7447-41-8, Lithium chloride, uses 7789-24-4, Lithium fluoride, uses 10377-51-2, Lithium iodide 12057-24-8, Lithia, uses
 RL: DEV (Device component use); USES (Uses)
 (glass; battery structures, self-organizing structures and

related methods)
 IT 7440-44-0, Carbon, uses 7782-42-5,
 Graphite, uses 15365-14-7, Iron lithium phosphate
 felipo4 114778-10-8, Iron lithium sulfate Fe2Li2(SO4)3
 RL: DEV (Device component use); USES (Uses)
 (battery structures, self-organizing structures and related
 methods)
 RN 7440-44-0 HCAPLUS
 CN Carbon (CA INDEX NAME)

C

RN 7782-42-5 HCAPLUS
 CN Graphite (CA INDEX NAME)

C

RN 15365-14-7 HCAPLUS
 CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

RN 114778-10-8 HCAPLUS
 CN Sulfuric acid, iron(2+) lithium salt (3:2:2) (9CI) (CA INDEX NAME)



●2/3 Fe(II)

●2/3 Li

L108 ANSWER 10 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN
 AN 2003:118181 HCAPLUS Full-text
 DN 138:156304

TI Battery structures, self-organizing structures, and related methods

IN Chiang, Yet-Ming; Moorehead, William Douglas; Holman, Richard K.; Viola, Michael S.; Gozdz, Antoni S.; Loxley, Andrew; Riley, Gilbert N., Jr.

PA Massachusetts Institute of Technology, USA; A123 Systems

SO PCT Int. Appl., 138 pp.

CODEN: TXXXD2

DT Patent

LA English

FAN.CNT 5

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2003012908	A2	20030213	WO 2002-US23880	20020726 <--
	WO 2003012908	A9	20040325		
	W:		AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW		
	RW:		GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG		
	US 20030082446	A1	20030501	US 2001-21740	20011022 <--
	CA 2455819	A1	20030213	CA 2002-2455819	20020726 <--
	AU 2002330924	A1	20030217	AU 2002-330924	20020726 <--
	EP 1433217	A2	20040630	EP 2002-768358	20020726 <--
	R:		AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, SK		
	JP 2005525674	T	20050825	JP 2003-517975	20020726 <--
	CN 1864298	A	20061115	CN 2002-818181	20020726 <--
	IN 2004KN00118	A	20060407	IN 2004-KN118	20040130 <--
PRAI	US 2001-308360P	P	20010727	<--	
	US 2001-21740	A	20011022	<--	
	US 2000-242124P	P	20001020	<--	
	WO 2002-US23880	W	20020726		
AB	An energy storage device includes a first electrode comprising a first material and a second electrode comprising a second material, at least a portion of the first and second materials forming an interpenetrating network when dispersed in an electrolyte, the electrolyte, the first material and the second material are selected so that the first and second materials exert a repelling force on each other when combined. An electrochem. device, includes a first electrode in elec. communication with a first current collector; a second electrode in elec. communication with a second current collector; and an ionically conductive medium in ionic contact with the first and second electrodes, wherein at least a portion of the first and second electrodes form an interpenetrating network and wherein at least one of the first and second electrodes comprises an electrode structure providing two or more pathways to its current collector.				
IC	ICM H01M0010-04				
	ICS H01M0010-40; H01M0004-04; H01M0004-02; H01B0009-00; G02F0001-00				
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology)				
	Section cross-reference(s): 38, 72				
ST	battery structure self organizing structure				
IT	Phosphazenes				
	RL: DEV (Device component use); USES (Uses)				

- (methoxyethoxy)ethoxy; battery structures, self-organizing structures, and related methods)
- IT Battery anodes
 - Battery cathodes
 - Conducting polymers
 - Embossing
 - Encapsulants
 - Ink-jet printing
 - Lithography
 - Polymer electrolytes
 - Primary batteries
 - Screen printing
 - (battery structures, self-organizing structures, and related methods)
- IT Fluoropolymers, uses
 - Polyamines
 - Polyimides, uses
 - Polyoxyalkylenes, uses
 - RL: DEV (Device component use); USES (Uses)
 - (battery structures, self-organizing structures, and related methods)
- IT Polyesters, uses
 - RL: TEM (Technical or engineered material use); USES (Uses)
 - (battery structures, self-organizing structures, and related methods)
- IT Polyesters, uses
 - RL: TEM (Technical or engineered material use); USES (Uses)
 - (battery structures, self-organizing structures, and related methods)
- IT Glass, uses
 - RL: DEV (Device component use); USES (Uses)
 - (bismuth lithium borate; battery structures, self-organizing structures, and related methods)
- IT Polymers, uses
 - RL: DEV (Device component use); USES (Uses)
 - (block, lithium salt-doped, electrolyte; battery structures, self-organizing structures, and related methods)
- IT Electric apparatus
 - (electrochem.; battery structures, self-organizing structures, and related methods)
- IT Polyoxyalkylenes, uses
 - RL: MOA (Modifier or additive use); USES (Uses)
 - (lithium complexes, perchlorate- or triflate-containing; battery structures, self-organizing structures, and related methods)
- IT Secondary batteries
 - (lithium; battery structures, self-organizing structures, and related methods)
- IT Composites
 - (nanocomposite; battery structures, self-organizing structures, and related methods)
- IT Printing (nonimpact)
 - (stenciling; battery structures, self-organizing structures, and related methods)
- IT Molding
 - (tape-casting; battery structures, self-organizing structures, and related methods)
- IT Coating process
 - (web; battery structures, self-organizing structures, and related methods)
- IT 7439-95-4, Magnesium, uses

- RL: MOA (Modifier or additive use); USES (Uses)
(ColiO2 doped with; battery structures, self-organizing structures, and related methods)
- IT 7440-03-1, Niobium, uses 7440-25-7, Tantalum, uses 7440-32-6, Titanium, uses 7440-33-7, Tungsten, uses
- RL: MOA (Modifier or additive use); USES (Uses)
(FeLiPO4 doped with; battery structures, self-organizing structures, and related methods)
- IT 7429-90-5, Aluminum, uses
- RL: MOA (Modifier or additive use); USES (Uses)
(LiMnO2 doped with; battery structures, self-organizing structures, and related methods)
- IT 68-12-2, n,n-Dimethylformamide, uses 75-11-6, Diiodomethane 96-49-1, Ethylene carbonate 105-58-8, DiEthyl carbonate 108-32-7, Propylene carbonate 616-38-6, DimEthyl carbonate 627-31-6, 1,3-Diiodopropane 1307-96-6, Cobalt oxide coo, uses 1313-13-9, Manganese oxide mno2, uses 1313-99-1, Nickel oxide nio, uses 1314-23-4, Zirconium oxide, uses 1314-62-1, Vanadia, uses 1317-34-6, Manganese oxide mn2o3 1317-35-7, Manganese oxide mn3o4 1335-25-7, Lead oxide 1344-43-0, Manganese oxidemno, uses 1345-25-1, Iron oxide feo, uses 7226-23-5 7439-93-2, Lithium, uses 7439-93-2D, Lithium, intercalation compound 7440-21-3, Silicon, uses 7440-22-4, Silver, uses 7440-31-5, Tin, uses 7440-36-0, Antimony, uses 7440-42-8, Boron, uses 7440-44-0, Carbon, uses 7440-56-4, Germanium, uses 7440-66-6, Zinc, uses 7440-69-9, Bismuth, uses 7782-42-5, Graphite, uses 9002-84-0, Ptfе 9003-53-6, Polystyrene 10361-43-0, Bismuth hydroxide 12002-78-7 12031-65-1, Lithium nickel oxide linio2 12037-30-8, Vanadium oxide v6o11 12042-37-4, Alli 12048-27-0, Bili 12057-17-9, Lithium manganese oxide limn2o4 12057-22-6, Liza 12057-30-6 12057-33-9 12063-07-9, Iron lithium oxide fe2lio4 12162-79-7, Lithium manganese oxide limno2 12190-79-3, Cobalt lithium oxide colio2 12253-44-0 12338-02-2 12651-23-9, Titanium hydroxide 13463-67-7, Titanium oxide, uses 14475-63-9, Zirconium hydroxide 15365-14-7, Iron lithium phosphate felipo4 18282-10-5, Tin dioxide 21324-40-3, Lithium hexafluorophosphate 21651-19-4, Tin oxide sno 24937-79-9, Polyvinylidene fluoride 25014-41-9, Polyacrylonitrile 25322-68-3, Peo 25322-69-4, Polypropylene oxide 37217-08-6, Lithium titanium oxide liti2o4 39345-91-0, Lead hydroxide 50851-57-5 53262-48-9 53640-36-1 55575-96-7, Lithium silicide Li13Si4 55608-41-8 56627-44-2 61812-08-6, Lithium silicide Li21Si8 66403-10-9, Lithium boride (Li5B4) 67070-82-0 71012-86-7, Lithium boride (Li7B6) 74083-26-4 76036-33-4, Lithium silicide Li12Si7 98973-15-0, MEEP 106494-93-3, Lithium silicide Li21Si5 126213-51-2, Poly(3,4-ethylenedioxythiophene) 144419-56-7, Cobalt lithium magnesium oxide Co0.95LiMg0.05O2 496816-56-9 496816-57-0, Cobalt lithium magnesium oxide (Co0.95Li0.95Mg0.05O1.9) 496816-58-1, Iron lithium zirconium phosphate (Fe0.98LiZr0.02(PO4))
- RL: DEV (Device component use); USES (Uses)
(battery structures, self-organizing structures, and related methods)
- IT 76-05-1, Trifluoroacetic acid, uses 104-15-4, Toluene sulfonic acid, uses 7647-01-0, Hydrochloric acid, uses 57534-41-5, Zonyl FSN
- RL: MOA (Modifier or additive use); USES (Uses)
(battery structures, self-organizing structures, and related methods)
- IT 9002-88-4, Polyethylene 11099-11-9, Vanadium oxide 25038-59-9, Mylar, uses
- RL: TEM (Technical or engineered material use); USES (Uses)
(battery structures, self-organizing structures, and related

methods)

IT 99742-70-8, Poly(o-methoxyaniline) 104934-51-2, Poly(3-octylthiophene)
 RL: TEM (Technical or engineered material use); USES (Uses)
 (coating; battery structures, self-organizing
 structures, and related methods)

IT 7440-50-8, Copper, uses
 RL: DEV (Device component use); USES (Uses)
 (current collector; battery structures, self-organizing
 structures, and related methods)

IT 7791-03-9, Lithium perchlorate 33454-82-9, Lithium triflate
 RL: MOA (Modifier or additive use); USES (Uses)
 (electrolyte, cog. polyethylene oxide; battery
 structures, self-organizing structures, and related methods)

IT 1303-86-2, Boron oxide b2o3, uses 1304-76-3, Bismuth oxide bi2o3, uses
 1314-56-3, Phosphorus pentoxide, uses 1317-36-8, Lead oxide pbo, uses
 7447-41-8, Lithium chloride, uses 7631-86-9, Silica, uses 7789-24-4,
 Lithium fluoride, uses 10377-51-2, Lithium iodide 12057-24-8, Lithia,
 uses
 RL: DEV (Device component use); USES (Uses)
 (glass; battery structures, self-organizing structures, and
 related methods)

IT 7439-93-2D, Lithium, polyethylene oxide complexes 25322-68-3D, Peo,
 lithium complexes
 RL: MOA (Modifier or additive use); USES (Uses)
 (perchlorate- or triflate-containing; battery structures,
 self-organizing structures, and related methods)

IT 7440-44-0, Carbon, uses 7782-42-5,
 Graphite, uses 15365-14-7, Iron lithium phosphate
 felipo4 53640-36-1
 RL: DEV (Device component use); USES (Uses)
 (battery structures, self-organizing structures, and related
 methods)

RN 7440-44-0 HCAPLUS
 CN Carbon (CA INDEX NAME)

C

RN 7782-42-5 HCAPLUS
 CN Graphite (CA INDEX NAME)

C

RN 15365-14-7 HCAPLUS
 CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

RN 53640-36-1 HCAPLUS

CN Sulfuric acid, iron(2+) lithium salt (2:1:2) (9CI) (CA INDEX NAME)



● 1/2 Fe(II)

● Li

L108 ANSWER 11 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2003:92339 HCAPLUS Full-text

DN 138:125008

TI Cathode materials for secondary lithium batteries

IN Armand, Michel; Goodenough, John B.; Padhi, Akshaya K.; Nanjundaswamy, Kirakodu S.; Masquelier, Christian

PA Board of Regents, the University of Texas System, USA

SO U.S., 21 pp., Cont.-in-part of U.S. 5,910,382.

CODEN: USXXAM

DT Patent

LA English

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6514640	B1	20030204	US 1997-998264	19971224 <--
	US 5910382	A	19990608	US 1997-840523	19970421 <--
	CA 2543784	A1	19971030	CA 1997-2543784	19970423 <--
	EP 1501137	A2	20050126	EP 2004-22447	19970423 <--
	EP 1501137	A3	20061025		
	R: DE, FR, GB, IT				
	EP 1755182	A1	20070221	EP 2006-20470	19970423 <--
	R: DE, FR, GB, IT				
	EP 1755183	A1	20070221	EP 2006-21083	19970423 <--
	R: DE, FR, GB, IT				
	US 6391493	B1	20020521	US 1999-298080	19990423 <--
	US 20030082454	A1	20030501	US 2002-307346	20021202 <--
	US 20050003274	A1	20050106	US 2004-902142	20040730 <--
	US 20050244321	A1	20051103	US 2005-179617	20050713 <--

US	20070117019	A1	20070524	US	2006-647899	20061229 <--
US	20070166618	A1	20070719	US	2006-648316	20061229 <--
JP	2007214147	A	20070823	JP	2007-128682	20070514 <--
JP	2007294463	A	20071108	JP	2007-128681	20070514 <--
US	20070281215	A1	20071206	US	2007-890130	20070803 <--

PRAI US 1996-16060P P 19960423 <--
 US 1996-32346P P 19961204 <--
 US 1997-840523 A2 19970421 <--
 CA 1997-2251709 A3 19970423 <--
 EP 1997-923437 A3 19970423 <--
 EP 2004-22447 A3 19970423 <--
 JP 1997-538259 A3 19970423 <--
 US 1997-998264 A1 19971224 <--
 US 2002-307346 B1 20021202
 US 2004-902142 A1 20040730
 US 2005-179617 A1 20050713

AB The invention relates to materials for use as electrodes in an alkali-ion secondary battery, particularly a lithium-ion battery. The invention provides transition-metal compds. having the ordered-olivine, a modified olivine, or the rhombohedral NASICON structure and the polyanion (PO4)3- as at least one constituent for use as electrode material for alkali-ion rechargeable batteries.

IC ICM H01M0004-58

INCL 429231100; 429218100; 429224000; 429221000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST cathode lithium secondary battery

IT Transition metal nitrides
 RL: DEV (Device component use); USES (Uses)
 (Li-containing; cathode materials for secondary lithium batteries)

IT EPDM rubber
 Fluoropolymers, uses
 Polyesters, uses
 Polyethers, uses
 RL: MOA (Modifier or additive use); USES (Uses)
 (binder; cathode materials for secondary lithium batteries)

IT Battery anodes
 Battery cathodes
 (cathode materials for secondary lithium batteries)

IT Chalcogenides
 RL: DEV (Device component use); USES (Uses)
 (lamellar; cathode materials for secondary lithium batteries)

IT Secondary batteries
 (lithium; cathode materials for secondary lithium batteries)

IT Lithium alloy, base
 RL: DEV (Device component use); USES (Uses)
 (cathode materials for secondary lithium batteries)

IT 116-14-3D, Tetrafluoroethylene, copolymer 9002-84-0, Ptfе
 9011-14-7, Pmma 24937-79-9, Pvdф 25014-41-9, Polyacrylonitrile
 RL: MOA (Modifier or additive use); USES (Uses)
 (binder; cathode materials for secondary lithium batteries)

IT 69104-84-3, Sodium vanadiumphosphate Na3V2(PO4)3
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
 (cathode materials for secondary lithium batteries)

IT 96-48-0, γ -Butyrolactone 96-49-1, Ethylene carbonate
 105-58-8, Diethyl carbonate 107-21-1D, Ethylene glycol, dialkyl ether 108-32-7, Propylene carbonate
 111-46-6D, DiEthylene glycol, dialkyl ether 112-27-6D, TriEthylene glycol, dialkyl ether 112-60-7D, TetraEthylene glycol, dialkyl ether

616-38-6, Dimethyl carbonate 623-53-0, Methyl ethyl carbonate 7439-93-2, Lithium, uses 7803-58-9D, Sulfamide, tetraalkyl derivative 36058-25-0, Iron lithium phosphate Fe₂Li₃(PO₄)₃ 39302-37-9, Lithium titanium oxide 39448-96-9, Graphite-lithium 77641-62-4, Nasicon 223505-09-7, Iron lithium titanium phosphate 277742-93-5, Vanadium oxide V₂O₅ 1314-62-5

RL: DEV (Device component use); USES (Uses)

(cathode materials for secondary lithium batteries)

IT 13824-63-0P, Cobalt lithium phosphate colipo4 13826-59-0P, Lithium manganese phosphate linmpo4 13977-83-8P, Lithium nickel phosphate linipo4 15365-14-7P, Iron lithium phosphate felipo4 37144-98-2P, Niobium titanium phosphate NbTi(PO₄)₃ 161774-31-8P, Iron lithium niobium phosphate FeLiNb(PO₄)₃ 184241-62-1P 205380-60-5P, Iron lithium phosphate sulfate Fe₂Li(PO₄)(SO₄)₂ 488829-05-6P, Iron lithium manganese phosphate (Fe_{0.5}-1LiMn_{0.5}(PO₄)) 488829-06-7P, Iron lithium titanium phosphate silicate (Fe_{0.8}Li_{1.1}Ti(PO₄)_{0.8}(SiO₄)_{0.2}) 951777-58-5P, Lithium sodium vanadium phosphate Li₂NaV₂(PO₄)₃

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(cathode materials for secondary lithium batteries)

IT 7440-44-0, Carbon, uses

RL: MOA (Modifier or additive use); USES (Uses)

(cathode materials for secondary lithium batteries)

IT 107-21-1D, Ethylene glycol, dialkyl ether 36058-25-0, Iron lithium phosphate Fe₂Li₃(PO₄)₃ 77641-62-4, Nasicon

RL: DEV (Device component use); USES (Uses)

(cathode materials for secondary lithium batteries)

RN 107-21-1 HCAPLUS

CN 1,2-Ethanediol (CA INDEX NAME)

HO-CH₂-CH₂-OH

RN 36058-25-0 HCAPLUS

CN Phosphoric acid, iron(3+) lithium salt (3:2:3) (9CI) (CA INDEX NAME)



● 2/3 Fe(III)

● Li

RN 77641-62-4 HCAPLUS

CN Nasicon (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IT 13824-63-0P, Cobalt lithium phosphate colipo4 13826-59-0P

, Lithium manganese phosphate limnpo4 13977-83-8P, Lithium
nickel phosphate linipo4 15365-14-7P, Iron lithium phosphate
felipo4

RL: DEV (Device component use); SPN (Synthetic preparation); PREP
(Preparation); USES (Uses)

(cathode materials for secondary lithium batteries)

RN 13824-63-0 HCAPLUS

CN Phosphoric acid, cobalt(2+) lithium salt (8CI, 9CI) (CA INDEX NAME)



● Co(II)

● Li

RN 13826-59-0 HCAPLUS

CN Phosphoric acid, lithium manganese(2+) salt (1:1:1) (9CI) (CA INDEX NAME)



● Li

● Mn(II)

RN 13977-83-8 HCAPLUS

CN Phosphoric acid, lithium nickel(2+) salt (1:1:1) (8CI, 9CI) (CA INDEX NAME)



● Li

● Ni(II)

RN 15365-14-7 HCAPLUS
 CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

IT 7440-44-0, Carbon, uses
 RL: MOA (Modifier or additive use); USES (Uses)
 (cathode materials for secondary lithium batteries)
 RN 7440-44-0 HCAPLUS
 CN Carbon (CA INDEX NAME)

C

RE.CNT 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 12 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2003:40437 HCAPLUS Full-text

DN 138:109577

TI Solid secondary lithium battery

IN Ogata, Naoya; Sata, Tsutomu

PA Torekion K. K., Japan

SO Jpn. Kokai Tokkyo Koho, 5 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2003017121	A	20030117	JP 2001-200782	20010702 <--
PRAI	JP 2001-200782		20010702	<--	

AB The battery has a Li or Li-intercalating anode, a Li-intercalating cathode, and a solid electrolyte in between; where the electrolyte is a solution containing a Li salt in a room temperature solid aromatic carbonate. Another type of the battery has a solid polymer electrolyte containing a crosslinked polyether polymer matrix and the above solution as continuous phase in the matrix.

IC ICM H01M0010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary Li battery polymer polyether solid

carbonate electrolyte

IT Secondary batteries

(lithium; compns. and structure of secondary Li batteries
 containing Li-intercalating electrodes and solid

- polymer electrolyte solns.)
- IT 7782-42-5, Graphite, uses 12031-95-7, Lithium titanium oxide (Li₄Ti₅O₁₂)
 RL: DEV (Device component use); USES (Uses)
 (anode; compns. and structure of secondary Li batteries containing Li-intercalating electrodes and solid polymer electrolyte solns.)
- IT 12190-79-3, Cobalt lithium oxide (CoLiO₂) 15365-14-7, Iron lithium phosphate (LiFePO₄)
 RL: DEV (Device component use); USES (Uses)
 (cathode; compns. and structure of secondary Li batteries containing Li-intercalating electrodes and solid polymer electrolyte solns.)
- IT 79-10-7D, Acrylic acid, polyoxyalkylene derivs. 115383-11-4
 RL: DEV (Device component use); USES (Uses)
 (compns. and structure of secondary Li batteries containing Li-intercalating electrodes and solid polymer electrolyte solns.)
- IT 82113-65-3, Bis(trifluoromethane sulfonyl) imide 90076-65-6
 RL: DEV (Device component use); USES (Uses)
 (salt, electrolyte; compns. and structure of secondary Li batteries containing Li-intercalating electrodes and solid polymer electrolyte solns.)
- IT 6222-20-4 486459-47-6
 RL: DEV (Device component use); USES (Uses)
 (solvent, electrolyte; compns. and structure of secondary Li batteries containing Li-intercalating electrodes and solid polymer electrolyte solns.)
- IT 7782-42-5, Graphite, uses
 RL: DEV (Device component use); USES (Uses)
 (cathode; compns. and structure of secondary Li batteries containing Li-intercalating electrodes and solid polymer electrolyte solns.)
- RN 7782-42-5 HCAPLUS
 CN Graphite (CA INDEX NAME)
- c
- IT 15365-14-7, Iron lithium phosphate (LiFePO₄)
 RL: DEV (Device component use); USES (Uses)
 (cathode; compns. and structure of secondary Li batteries containing Li-intercalating electrodes and solid polymer electrolyte solns.)
- RN 15365-14-7 HCAPLUS
 CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

L108 ANSWER 13 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2002:904470 HCAPLUS Full-text

DN 137:372594

TI Lithium transition-metal phosphate powder for rechargeable batteries

PA N.V. Umicore S.A., Belg.; Centre National de la Recherche Scientifique

SO Eur. Pat. Appl., 15 pp.

CODEN: EPXXDW

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1261050	A1	20021127	EP 2001-401374	20010523 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
	CA 2448175	A1	20021212	CA 2002-2448175	20020522 <--
	WO 2002099913	A1	20021212	WO 2002-EP5714	20020522 <--
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW				
	RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	AU 2002325218	A1	20021216	AU 2002-325218	20020522 <--
	EP 1396038	A1	20040310	EP 2002-758202	20020522 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
	CN 1511352	A	20040707	CN 2002-810352	20020522 <--
	CN 100340018	C	20070926		
	JP 2004529059	T	20040924	JP 2003-502910	20020522 <--
	TW 589758	B	20040601	TW 2002-91110911	20020523 <--
	US 20040175614	A1	20040909	US 2003-719134	20031121 <--
	US 7371482	B2	20080513		
PRAI	EP 2001-401374	A	20010523	<--	
	WO 2002-EP5714	W	20020522	<--	

AB The invention concerns the manufacture and use of phosphates of transition metals as pos. electrodes for secondary lithium batteries and discloses a process for the production of LiMPO₄ with controlled size and morphol., M being FexCoyNizMnw, with 0 ≤ x ≤ 1, 0 ≤ y ≤ 1, 0 ≤ z ≤ 1, 0 ≤ w ≤ 1 and x+y+z+w = 1. A process is disclosed for the manufacture of LiFePO₄, comprising the

steps of providing an equimolar aqueous solution of Li^+ , Fe^{3+} and PO_4^{3-} , evaporating the water from the solution, thereby producing a solid mixture, decomposing the solid mixture at a temperature below 500° to form a pure homogeneous Li and Fe phosphate precursor, and annealing the precursor at a temperature of less than 800° in a reducing atmospheric, thereby forming a LiFePO_4 powder. The obtained powders have a particle size of less than $1\text{ }\mu\text{m}$, and provide superior electrochem. performances once mixed for an appropriate time with elec. conductive powder.

- IC ICM H01M0004-58
ICS C01B0025-30; C01B0025-37
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST Battery cathode lithium transition metal phosphate powder
IT Battery cathodes
(lithium transition-metal phosphate powder for rechargeable batteries)
IT Secondary batteries
(lithium; lithium transition-metal phosphate powder for rechargeable batteries)
IT Transition metal compounds
RL: DEV (Device component use); USES (Uses)
(phosphates; lithium transition-metal phosphate powder for rechargeable batteries)
IT 15365-14-7E, Iron lithium phosphate FeLiPO_4 475273-80-4P
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(lithium transition-metal phosphate powder for rechargeable batteries)
IT 15365-14-7P, Iron lithium phosphate FeLiPO_4
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(lithium transition-metal phosphate powder for rechargeable batteries)
RN 15365-14-7 HCAPLUS
CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 14 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2002:408971 HCAPLUS [Full-text](#)
DN 136:388549
TI Reticulated and controlled porosity battery structures
IN Chiang, Yet-Ming; Hellweg, Benjamin
PA Massachusetts Institute of Technology, USA
SO PCT Int. Appl., 44 pp.

CODEN: PIXXD2

DT Patent
 LA English
 FAN.CNT 5

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002043168	A2	20020530	WO 2001-US48345	20011022 <--
	WO 2002043168	A3	20030724		
	WO 2002043168	A9	20031204		
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW				
	RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	CA 2426156	A1	20020530	CA 2001-2426156	20011022 <--
	AU 2002041629	A	20020603	AU 2002-41629	20011022 <--
	EP 1352436	A2	20031015	EP 2001-988312	20011022 <--
	EP 1352436	B1	20080820		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
	CN 1470083	A	20040121	CN 2001-817679	20011022 <--
	CN 1278441	C	20061004		
	JP 2004525481	T	20040819	JP 2002-544796	20011022 <--
	CN 1901255	A	20070124	CN 2006-10115050	20011022 <--
	AT 405960	T	20080915	AT 2001-988312	20011022 <--
	JP 2006100280	A	20060413	JP 2005-308683	20051024 <--
	JP 2007066913	A	20070315	JP 2006-274391	20061005 <--
	KR 2008081377	A	20080909	KR 2008-721160	20080828 <--
PRAI	US 2000-242124P	P	20001020	<--	
	CN 2001-817679	A3	20011022	<--	
	JP 2002-544796	A3	20011022	<--	
	WO 2001-US48345	W	20011022	<--	
	KR 2003-705495	A3	20030419		

AB The effective ionic conductivity in a composite structure is believed to decrease rapidly with volume fraction. A system, such as a bipolar device or energy storage device, has structures or components in which the diffusion length or path that electrodes or ions must traverse is minimized and the interfacial area exposed to the ions or electrons is maximized. The device includes components that can be reticulated or has a reticulated interface so that an interface area can be increased. The increased interfacial perimeter increases the available sites for reaction of ionic species. Many different reticulation patterns can be used. The aspect ratio of the reticulated features can be varied. Such bipolar devices can be fabricated by a variety of methods or procedures. A bipolar device having structures of reticulated interface can be tailored for the purposes of controlling and optimizing charge and discharge kinetics. A bipolar device having graded porosity structures can have improved transport properties because the diffusion controlling reaction kinetics can be modified. Graded porosity electrodes can be linearly or nonlinearly graded. A bipolar device having perforated structures also provides improved transport properties by removing tortuosity and reducing diffusion distance.

IC ICM H01M0004-00
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 ST battery structure reticulated controlled porosity
 IT Vapor deposition process

- (chemical; reticulated and controlled porosity battery structures)
- IT Sedimentation (separation)
(differential; reticulated and controlled porosity battery structures)
- IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(lithium complexes; reticulated and controlled porosity battery structures)
- IT Battery cathodes
Evaporation
Porosity
Screen printing
Secondary batteries
Sputtering
Surface area
Web materials
(reticulated and controlled porosity battery structures)
- IT Fluoropolymers, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(reticulated and controlled porosity battery structures)
- IT Molding
(tape-casting; reticulated and controlled porosity battery structures)
- IT Coating process
(web; reticulated and controlled porosity battery structures)
- IT 91-20-3, Naphthalene, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(pore former; reticulated and controlled porosity battery structures)
- IT 96-49-1, Ethylene carbonate 616-38-6, Dimethyl carbonate 7429-90-5, Aluminum, uses 7439-93-2D, Lithium, polyethylene oxide complex 7440-22-4, Silver, uses 7440-31-5, Tin, uses 7440-36-0, Antimony, uses 7440-44-0, Carbon, uses 7440-66-6, Zinc, uses 12031-65-1, Lithium nickel oxide linio2 12057-17-9, Lithium manganese oxide limn2o4 12057-30-6 12162-79-7, Lithium manganese oxide limno2 12190-79-3, Cobalt lithium oxide colio2 12798-95-7 15365-14-7, Iron lithium phosphate felipo4 25322-68-3D, Peo, lithium complexes 144419-56-7, Cobalt lithium magnesium oxide Co0.95LiMg0.0502
RL: DEV (Device component use); USES (Uses)
(reticulated and controlled porosity battery structures)
- IT 1314-62-1, Vanadium pentoxide, uses 12338-02-2
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(reticulated and controlled porosity battery structures)
- IT 24937-79-9, PvdF
RL: TEM (Technical or engineered material use); USES (Uses)
(reticulated and controlled porosity battery structures)
- IT 7440-44-0, Carbon, uses 15365-14-7, Iron lithium phosphate felipo4
RL: DEV (Device component use); USES (Uses)
(reticulated and controlled porosity battery structures)
- RN 7440-44-0 HCAPLUS
- CN Carbon (CA INDEX NAME)

RN 15365-14-7 HCAPLUS
 CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 15 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2002:272913 HCAPLUS Full-text

DN 136:297399

TI Nonaqueous electrolyte secondary battery with a
 compound of an olivine structure as a cathode active material
 IN Okawa, Tsuyoshi; Hosoya, Mamoru; Kuyama, Junji; Fukushima, Yuzuru
 PA Sony Corporation, Japan
 SO Eur. Pat. Appl., 15 pp.

CODEN: EPXXDW

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1195836	A2	20020410	EP 2001-123892	20011005 <--
	EP 1195836	A3	20041124		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	JP 2002117833	A	20020419	JP 2000-308301	20001006 <--
	JP 3997702	B2	20071024		
	CN 1349266	A	20020515	CN 2001-142412	20010930 <--
	CN 1180498	C	20041215		
	CA 2358256	A1	20020406	CA 2001-2358256	20011003 <--
	US 20020106564	A1	20020808	US 2001-972395	20011005 <--
	US 6656635	B2	20031202		
	TW 525312	B	20030321	TW 2001-90124680	20011005 <--
	MX 2001010061	A	20030820	MX 2001-10061	20011005 <--
	KR 776523	B1	20071115	KR 2001-61592	20011006 <--
PRAI	JP 2000-308301	A	20001006	<--	

AB A non-aqueous electrolyte secondary cell containing a compound of an olivine structure as a cathode active material is to be improved in load characteristics and cell capacity. To this end, there is provided a non-aqueous electrolyte secondary cell including a cathode having a layer of a cathode active material containing a compound represented by the general formula $\text{Li}_x\text{Fe}_y\text{M}_z\text{PO}_4$, where M is at least one selected from the group consisting of Mn, Cr, Co, Cu, Ni, V, Mo, Ti, Zn, Al, Ga, Mg, B and Nb, with $0.05 \leq x \leq 1.2$ and $0 \leq y \leq 0.8$, an anode having a layer of an anode active material and a non-aqueous electrolyte, wherein the layer of the cathode

active material has a film thickness in a range from 25 to 110 μm . If a layer of a cathode active material is provided on each surface of a cathode current collector, the sum of the film thicknesses of the layers of the cathode active material ranges between 50 and 220 μm . The non-aqueous electrolyte may be a liquid-based electrolyte or a polymer electrolyte.

- IC ICM H01M0010-40
ICS H01M0004-58
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
- ST battery secondary olivinic structure cathode active material
- IT Ball milling
Battery cathodes
Secondary batteries
(nonaq. electrolyte secondary battery with compound of olivinic structure as cathode active material)
- IT Carbon black, uses
RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(nonaq. electrolyte secondary battery with compound of olivinic structure as cathode active material)
- IT 10377-52-3, Lithium phosphate 13977-75-8, Phosphoric acid, iron(3+) salt (3:2)
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(nonaq. electrolyte secondary battery with compound of olivinic structure as cathode active material)
- IT 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 7440-44-0, Carbon, uses 7782-42-5, Graphite, uses 15365-14-7, Iron lithium phosphate FeLiPO_4 21324-40-3, Lithium hexafluorophosphate 407606-22-8, Chromium iron lithium phosphate $(\text{Cr}_{0.08}\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}(\text{PO}_4))$ 407606-24-0, Cobalt iron lithium phosphate $(\text{Co}_{0.08}\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}(\text{PO}_4))$ 407606-26-2, Copper iron lithium phosphate $(\text{Cu}_{0.08}\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}(\text{PO}_4))$ 407606-28-4, Aluminum iron lithium phosphate $(\text{Al}_{0.08}\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}(\text{PO}_4))$ 407606-30-8, Gallium iron lithium phosphate $(\text{Ga}_{0.08}\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}(\text{PO}_4))$ 407606-32-0, Boron iron lithium phosphate $(\text{B}_{0.08}\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}(\text{PO}_4))$ 407606-36-4, Iron lithium nickel phosphate $(\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}\text{Ni}_{0-0.8}(\text{PO}_4))$ 407606-39-7, Iron lithium vanadium phosphate $(\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}\text{V}_{0-0.8}(\text{PO}_4))$ 407606-42-2, Iron lithium molybdenum phosphate $(\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}\text{Mo}_{0-0.8}(\text{PO}_4))$ 407606-44-4, Iron lithium titanium phosphate $(\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}\text{Ti}_{0-0.8}(\text{PO}_4))$ 407606-47-7, Iron lithium zinc phosphate $(\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}\text{Zn}_{0-0.8}(\text{PO}_4))$ 407606-49-9, Iron lithium magnesium phosphate $(\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}\text{Mg}_{0-0.8}(\text{PO}_4))$ 407606-51-3, Iron lithium niobium phosphate $(\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}\text{Nb}_{0-0.8}(\text{PO}_4))$ 407629-83-8 407629-87-2 407629-90-7 407629-95-2 407630-01-7 407630-05-1 407630-10-8 407630-14-2 407630-19-7 407630-25-5, Aluminum iron lithium phosphate $(\text{Al}_{0.7}\text{Fe}_{0.3}\text{Li}(\text{PO}_4))$ 407630-29-9, Gallium iron lithium phosphate $(\text{Ga}_{0.7}\text{Fe}_{0.3}\text{Li}(\text{PO}_4))$ 407630-35-7 407630-40-4, Boron iron lithium phosphate $(\text{B}_{0.75}\text{Fe}_{0.25}\text{Li}(\text{PO}_4))$ 407630-46-0
RL: DEV (Device component use); USES (Uses)
(nonaq. electrolyte secondary battery with compound of olivinic structure as cathode active material)
- IT 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(nonaq. electrolyte secondary battery with compound of olivinic structure as cathode active material)
- IT 7439-93-2, Lithium, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical

process); PYP (Physical process); PROC (Process); USES (Uses)
 (nonaq. electrolyte secondary battery with compound
 of olivinic structure as cathode active material)
 IT 10377-52-3, Lithium phosphate
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical
 process); PROC (Process)
 (nonaq. electrolyte secondary battery with compound
 of olivinic structure as cathode active material)
 RN 10377-52-3 HCAPLUS
 CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



● Li

IT 7440-44-0, Carbon, uses 7782-42-5,
 Graphite, uses 15365-14-7, Iron lithium phosphate
 felipo4
 RL: DEV (Device component use); USES (Uses)
 (nonaq. electrolyte secondary battery with compound
 of olivinic structure as cathode active material)
 RN 7440-44-0 HCAPLUS
 CN Carbon (CA INDEX NAME)

C

RN 7782-42-5 HCAPLUS
 CN Graphite (CA INDEX NAME)

C

RN 15365-14-7 HCAPLUS
 CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 16 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2002:256645 HCAPLUS [Full-text](#)

DN 136:297382

TI Carbon-coated or carbon-crosslinked redox
materials with transition metal-lithium oxide core for use as
battery electrodes

IN Armand, Michel; Gauthier, Michel; Magnan, Jean-Francois; Ravet, Nathalie

PA Hydro-Quebec, Can.

SO PCT Int. Appl., '78 pp.

CODEN: PIXXD2

DT Patent

LA French

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002027824	A1	20020404	WO 2001-CA1350	20010921 <--
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW				
	RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	CA 2320661	A1	20020326	CA 2000-2320661	20000926 <--
	CA 2423129	A1	20020404	CA 2001-2423129	20010921 <--
	AU 2001093569	A	20020408	AU 2001-93569	20010921 <--
	EP 1325526	A1	20030709	EP 2001-973907	20010921 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
	JP 2004509058	T	20040325	JP 2002-531518	20010921 <--
	CN 100421289	C	20080924	CN 2001-816319	20010921 <--
	US 20040086445	A1	20040506	US 2003-362764	20030619 <--
	US 7285260	B2	20071023		
	US 20070134554	A1	20070614	US 2007-655084	20070119 <--
	US 7457018	B2	20081125		
PRAI	CA 2000-2320661	A	20000926	<--	
	WO 2001-CA1350	W	20010921	<--	
	US 2003-362764	A1	20030619		
AB	Carbon-coated redox materials suitable for use in battery electrodes consist of a core surrounded by a coating, or interconnected by carbon crosslinks, in which the core includes a composition of formula $\text{Li}_x\text{M}_1-\text{yM}'_y(\text{XO}_4)_n$, in which $y = 0-0.6$, $x = 0-2$, $n = 0-1.5$; M is a transition metal; and M' is a element of fixed valence selected from Mg^{2+} , Ca^{2+} , Al^{3+} , and Zn^{2+} , and X is S, P, and Si. Synthesis of the materials is carried out by reacting a balanced mixture of appropriate precursors in a reducing atmospheric, to adjust the valence of the transition metals, in the presence of a carbon source, which is then pyrolyzed. The resulting products exhibit an excellent elec. conductivity and a highly enhanced chemical activity.				
IC	ICM H01M0004-48				
	ICS C01B0025-37; C01B0033-20; H01M0004-58; H01M0004-62; C01B0017-96				
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology)				
ST	carbon encapsulated redox material battery electrode; cathode battery carbon coated redox material				

- IT Silanes
RL: RCT (Reactant); RACT (Reactant or reagent)
(alkoxy, silicon source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT Polyoxoalkylenes, uses
RL: NUU (Other use, unclassified); USES (Uses)
(alkyl ethers, oligomeric, aprotic solvent; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT Fluoropolymers, uses
Polyesters, uses
Polyethers, uses
RL: NUU (Other use, unclassified); USES (Uses)
(binders; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT Battery cathodes
Battery electrodes
Redox agents
(carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT Transition metals, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(electrodes containing; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 78-93-3, Methyl ethyl ketone, uses 96-48-0, Butyrolactone 96-49-1, Ethylene carbonate 107-21-1D, Ethylene glycol, alkyl ethers 108-32-7, Propylene carbonate 111-46-6D, Diethylene glycol, alkyl ethers 112-27-6D, Triethylene glycol, alkyl ethers 112-60-7D, Tetraethylene glycol, alkyl ethers 463-79-6D, Carbonic acid, Cl-4-alkyl esters
RL: NUU (Other use, unclassified); USES (Uses)
(aprotic solvent; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 9011-14-7, Poly(methyl methacrylate) 24937-79-9, Poly(vinylidene difluoride) 25014-41-9, Polyacrylonitrile
RL: NUU (Other use, unclassified); USES (Uses)
(binders; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 50-99-7, Glucose, reactions 57-48-7, Fructose, reactions 57-50-1, Sucrose, reactions 58-86-6, Xylose, reactions 87-79-6, Sorbose 9002-88-4, Polyethylene 9003-07-0, Polypropylene 9004-34-6, Cellulose, reactions 9004-34-6D, Cellulose, esters 9004-35-7, Cellulose acetate 9005-25-8, Starch, reactions 25212-86-6, Poly(furfuryl alcohol) 43094-71-9, Ethylene-ethylene oxide copolymer
RL: RCT (Reactant); RACT (Reactant or reagent)
(carbon source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 407640-63-5, Iron lithium titanium phosphate sulfate (Fe_{0.85}Li_{1.35}Ti_{0.15}(PO₄)_{0.5}(SO₄))

- RL: DEV (Device component use); USES (Uses)
(electrodes containing; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 7439-89-6D, Iron, mixed oxides 7439-96-5D, Manganese, mixed oxides
7440-02-0D, Nickel, mixed oxides 7440-32-6D, Titanium, mixed oxides
7440-47-3D, Chromium, mixed oxides 7440-48-4D, Cobalt, mixed oxides
7440-50-8D, Copper, mixed oxides 7440-62-2D, Vanadium, mixed oxides
13816-45-0, Triphylite 15365-14-7, Iron lithium phosphate
(FeLiPO4) 213467-46-0, Iron lithium manganese phosphate (FeLi2Mn(PO4)2)
- RL: TEM (Technical or engineered material use); USES (Uses)
(electrodes containing; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 90076-65-6
- RL: NUU (Other use, unclassified); USES (Uses)
(electrolyte containing; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 516-03-0, Ferrous oxalate
- RL: RCT (Reactant); RACT (Reactant or reagent)
(iron source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 7429-90-5, Aluminum, uses 7440-31-5, Tin, uses 7440-36-0, Antimony, uses 7440-66-6, Zinc, uses 7782-42-5, Graphite, uses 39302-37-9, Lithium titanate 207803-50-7, Aluminum cobalt lithium magnesium nickel oxide 258511-24-9, Iron lithium nitride 263898-18-6, Cobalt manganese nitride 407640-62-4
- RL: DEV (Device component use); USES (Uses)
(lithium-based cathodes containing; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 638-38-0, Manganese(II) acetate
- RL: RCT (Reactant); RACT (Reactant or reagent)
(manganese source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 546-89-4, Lithium acetate 553-91-3, Lithium oxalate 554-13-2, Lithium carbonate 1309-37-1, Ferric oxide, reactions 1310-65-2, Lithium hydroxide 1313-13-9, Manganese dioxide, reactions 1314-62-1, Vanadium pentoxide, reactions 1317-61-9, Magnetite, reactions 10045-86-0, Ferric phosphate 10102-24-6, Lithium silicate (Li2SiO3) 10377-48-7, Lithium sulfate 10377-52-3, Lithium phosphate (Li3PO4) 10421-48-4, Ferric nitrate 12057-24-8, Lithium oxide, reactions 12627-14-4 13453-80-0, Lithium dihydrogen phosphate 63985-45-5, Lithium orthosilicate 407640-52-2, Iron lithium manganese phosphate (Fe0.1-LiMn0.9(PO4)) 407640-53-3, Iron lithium magnesium phosphate (Fe0.7-LiMg0.3(PO4)) 407640-54-4, Calcium iron lithium phosphate (Ca0.3Fe0.7-Li(PO4)) 407640-55-5 407640-56-6, Iron lithium phosphate silicate (FeLi1.9(PO4)0.1-Li(SiO4)0.9) 407640-57-7 407640-58-8, Iron lithium manganese phosphate sulfate (Fe0.1Li1.2Mn0.0.2[(PO4)(SO4)]) 407640-59-9, Iron lithium manganese phosphate ((Fe,Mn)Li1.6(PO4)) 407640-60-2, Iron lithium manganese phosphate sulfate (Fe1-2Li1-2Mn0-1[(PO4)(SO4)]) 407640-61-3, Iron lithium titanium phosphate ((Fe,Ti)Li0.5-2(PO4)1.5)

- RL: RCT (Reactant); RACT (Reactant or reagent)
 (metal source; carbon-coated or carbon
 -crosslinked redox materials with transition metal-lithium oxide core
 for use as battery electrodes)
- IT 25322-68-3D, Polyethylene glycol, alkyl ethers
 RL: NUU (Other use, unclassified); USES (Uses)
 (oligomeric, aprotic solvent; carbon-coated or
 carbon-crosslinked redox materials with transition
 metal-lithium oxide core for use as battery
 electrodes)
- IT 7664-38-2, Phosphoric acid, reactions 7664-38-2D, Phosphoric acid,
 esters 7783-28-0, Ammonium hydrogen phosphate 10124-54-6, Manganese
 phosphate
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (phosphorus source; carbon-coated or carbon
 -crosslinked redox materials with transition metal-lithium oxide core
 for use as battery electrodes)
- IT 7631-86-9, Silica, reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (silicon source; carbon-coated or carbon
 -crosslinked redox materials with transition metal-lithium oxide core
 for use as battery electrodes)
- IT 7664-93-9, Sulfuric acid, reactions 7783-20-2, Ammonium sulfate,
 reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (sulfur source; carbon-coated or carbon
 -crosslinked redox materials with transition metal-lithium oxide core
 for use as battery electrodes)
- IT 107-21-1B, Ethylene glycol, alkyl ethers
 RL: NUU (Other use, unclassified); USES (Uses)
 (aprotic solvent; carbon-coated or carbon
 -crosslinked redox materials with transition metal-lithium oxide core
 for use as battery electrodes)
- RN 107-21-1 HCAPLUS
 CN 1,2-Ethanediol (CA INDEX NAME)

HO-CH₂-CH₂-OH

- IT 15365-14-7, Iron lithium phosphate (FeLiPO₄)
 RL: TEM (Technical or engineered material use); USES (Uses)
 (electrodes containing; carbon-coated or
 carbon-crosslinked redox materials with transition
 metal-lithium oxide core for use as battery
 electrodes)
- RN 15365-14-7 HCAPLUS
 CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

IT 7782-42-5, Graphite, uses

RL: DEV (Device component use); USES (Uses)
 (lithium-based cathodes containing; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)

RN 7782-42-5 HCAPLUS

CN Graphite (CA INDEX NAME)

C

IT 10377-52-3, Lithium phosphate (Li3PO4) 10421-48-4,
 Ferric nitrate 13453-80-0, Lithium dihydrogen phosphate

RL: RCT (Reactant); RACT (Reactant or reagent)
 (metal source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

RN 10421-48-4 HCAPLUS

CN Nitric acid, iron(3+) salt (3:1) (CA INDEX NAME)



●1/3 Fe(III)

RN 13453-80-0 HCAPLUS
 CN Phosphoric acid, lithium salt (1:1) (CA INDEX NAME)



● Li

RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 17 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2002:256644 HCAPLUS Full-text

DN 136:297381

TI Method for synthesis of carbon-coated redox materials
 with controlled size

IN Armand, Michel; Gauhtier, Michel; Magnan, Jean-Francois; Ravet, Nathalie

PA Hydro-Quebec, Can.

SO PCT Int. Appl., 83 pp.

CODEN: PIXXD2

DT Patent

LA French

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002027823	A1	20020404	WO 2001-CA1349	20010921 <--
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW			
	RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			
	CA 2320661	A1	20020326	CA 2000-2320661	20000926 <--
	CA 2422446	A1	20020404	CA 2001-2422446	20010921 <--
	AU 2001093568	A	20020408	AU 2001-93568	20010921 <--
	EP 1325525	A1	20030709	EP 2001-973906	20010921 <--
	R:	AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR			
	JP 2004509447	T	20040325	JP 2002-531517	20010921 <--
	CN 100421289	C	20080924	CN 2001-816319	20010921 <--
	US 20040033360	A1	20040219	US 2003-362763	20030619 <--
PRAI	CA 2000-2320661	A	20000926	<--	
	WO 2001-CA1349	W	20010921	<--	

AB Carbon-coated redox materials suitable for use as battery electrodes and for fabrication of electrochromic materials, consist of compns. of formulas C-LixM1-y (XO4)n or LixM1-yM'y (XO4)n, in which: y = 0-0.6; x = 0-2; n = 1-1.5; M is a transition metal or a mixture of first-row transition metals; M' is a fixed-valent metal ion selected from Mg2+, Ca2+, Al3+, or Zn2+; and X is S, P, and Si. The resulting materials consist of particles coated with a conductive carbon layer. The compns. are prepared by reacting a balanced mixture of precursors in the appropriate proportions, including a pyrolysis step for the

carbon-producing compound(s), such that the materials form a powdered composition with the desired formula, that has an elec. conductivity of >10-8 S/cm when compacted at 3750 kg/cm².

- IC ICM H01M0004-48
ICS H01M0004-58; H01M0004-62; C01B0025-37; C01B0033-20
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72
- ST carbon encapsulated redox material battery
electrode; electrochromic material carbon coated
redox particle size; cathode battery
carbon coated redox material
- IT Fluoropolymers, uses
RL: NUU (Other use, unclassified); USES (Uses)
(binder; synthesis of carbon-coated redox materials
for use as battery cathodes and in electrochromic
devices)
- IT Battery cathodes
Battery electrodes
Electrochromic materials
Redox agents
(synthesis of carbon-coated redox materials for use
as battery cathodes and in electrochromic devices)
- IT 24937-79-9, Poly(vinylidene difluoride)
RL: NUU (Other use, unclassified); USES (Uses)
(binder; synthesis of carbon-coated redox materials
for use as battery cathodes and in electrochromic
devices)
- IT 9004-35-7, Cellulose acetate 43094-71-9, Ethylene-ethylene oxide
copolymer
RL: RCT (Reactant); RACT (Reactant or reagent)
(carbon source; synthesis of carbon-coated
redox materials for use as battery cathodes and in
electrochromic devices)
- IT 7440-44-0, Carbon, uses
RL: DEV (Device component use); USES (Uses)
(coating, cathodes containing; synthesis of
carbon-coated redox materials for use as
battery cathodes and in electrochromic devices)
- IT 96-49-1, Ethylene carbonate 616-38-6,
Dimethylcarbonate 7791-03-9, Lithium perchlorate 90076-65-6,
Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-,
lithium salt
RL: NUU (Other use, unclassified); USES (Uses)
(electrolyte containing; synthesis of carbon-
coated redox materials for use as battery
cathodes and in electrochromic devices)
- IT 554-13-2, Lithium carbonate
RL: RCT (Reactant); RACT (Reactant or reagent)
(reaction of; synthesis of carbon-coated redox
materials for use as battery cathodes and in
electrochromic devices)
- IT 13463-10-0, Ferric phosphate dihydrate
RL: RCT (Reactant); RACT (Reactant or reagent)
(reduction of; synthesis of carbon-coated redox
materials for use as battery cathodes and in
electrochromic devices)
- IT 7429-90-5P, Aluminum, uses 7439-95-4P, Magnesium, uses 7440-66-6P,
Zinc, uses 7440-70-2P, Calcium, uses 13816-45-0P, Triphylite
15365-14-7P, Iron lithium phosphate (FeLiPO₄) 213467-46-0P, Iron
lithium manganese phosphate (FeLi₂Mn(PO₄)₂)

RL: DEV (Device component use); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent); USES (Uses) (redox cathode containing; synthesis of carbon-coated redox materials for use as battery cathodes and in electrochromic devices)

IT 7440-44-0, Carbon, uses

RL: DEV (Device component use); USES (Uses) (coating, cathodes containing; synthesis of carbon-coated redox materials for use as battery cathodes and in electrochromic devices)

RN 7440-44-0 HCAPLUS

CN Carbon (CA INDEX NAME)

C

IT 15365-14-7P, Iron lithium phosphate (FeLiPO4)

RL: DEV (Device component use); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent); USES (Uses) (redox cathode containing; synthesis of carbon-coated redox materials for use as battery cathodes and in electrochromic devices)

RN 15365-14-7 HCAPLUS

CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 18 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2002:253129 HCAPLUS Full-text

DN 136:281939

TI Nonaqueous electrolyte battery cathode

active material capable of reversibly doping/undoping lithium

IN Hosoya, Mamoru; Takahashi, Kimio; Fukushima, Yuzuru

PA Sony Corporation, Japan

SO Eur. Pat. Appl., 16 pp.

CODEN: EPXXDW

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1193787	A2	20020403	EP 2001-123181	20010927 <--

EP 1193787 A3 20040303
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,
 IE, SI, LT, LV, FI, RO

JP 2002110161 A 20020412 JP 2000-301399 20000929 <--
 US 20020114754 A1 20020822 US 2001-961895 20010924 <--
 TW 518781 B 20030121 TW 2001-90123611 20010925 <--
 MX 2001009736 A 20040812 MX 2001-9736 20010927 <--
 CN 1350341 A 20020522 CN 2001-142556 20010929 <--
 CN 1187851 C 20050202

PRAI JP 2000-301399 A 20000929 <--

AB An LiFePO₄ carbon composite material is to be synthesized in a single phase to realize superior cell characteristics. To this end, in the preparation of a cathode active material, starting materials for synthesis of a compound having the formula Li_xFePO₄, where $0 < x \leq 1$, are mixed together, milled and sintered. A carbon material is added at one of these steps. As the starting materials for synthesis for Li_xFePO₄, Li₃PO₄, Fe₃PO₄, Fe₃(PO₄)₂ or its hydrate Fe₃(PO₄)₂·nH₂O, where n is the number of hydrates, are used, and the content of Fe³⁺ in the total iron in Fe₃(PO₄)₂ or its hydrate Fe₃(PO₄)₂·nH₂O is set to 61 wt% or less.

IC ICM H01M0004-58
 ICS H01M0010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST battery cathode lithium iron phosphate carbon composite

IT Secondary batteries
 (lithium; nonaq. electrolyte battery
 cathode active material capable of reversibly doping/undoping lithium)

IT Ball milling
 Battery cathodes
 Composites
 Sintering
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)

IT Carbonaceous materials (technological products)
 RL: DEV (Device component use); USES (Uses)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)

IT Fluoropolymers, uses
 RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)

IT 10028-23-6, Phosphoric acid, iron(2+) salt (2:3) octahydrate 10045-86-0, Ferric phosphate 10377-52-3, Lithium phosphate li₃po₄ 31096-55-6
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)

IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate 7439-93-2, Lithium, uses 7440-44-0, Carbon, uses 7782-42-5, Graphite, uses 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 15365-14-7, Iron lithium phosphate FeLiPO₄ 21324-40-3, Lithium hexafluorophosphate
 RL: DEV (Device component use); USES (Uses)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)

IT 24937-79-9, PvdF

RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)
 IT 198782-39-7P, Iron lithium phosphate (FeLiO-1(PO4))
 RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)
 IT 872-36-6, Vinylene carbonate
 RL: MOA (Modifier or additive use); USES (Uses)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)
 IT 10377-52-3, Lithium phosphate li3po4
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)
 RN 10377-52-3 HCAPLUS
 CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

IT 7440-44-0, Carbon, uses 7782-42-5,
 Graphite, uses 15365-14-7, Iron lithium phosphate
 FeLiPO4
 RL: DEV (Device component use); USES (Uses)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)
 RN 7440-44-0 HCAPLUS
 CN Carbon (CA INDEX NAME)

c

RN 7782-42-5 HCAPLUS
 CN Graphite (CA INDEX NAME)

c

RN 15365-14-7 HCAPLUS
 CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

RE.CNT 1 THERE ARE 1 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 19 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2002:253128 HCAPLUS Full-text

DN 136:281938

TI Nonaqueous electrolyte battery cathode
active material capable of reversibly doping/undoping lithium

IN Hosoya, Mamoru; Takahashi, Kimio; Fukushima, Yuzuru

PA Sony Corporation, Japan

SO Eur. Pat. Appl., 15 pp.

CODEN: EPXXDW

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1193786	A2	20020403	EP 2001-123180	20010927 <--
	EP 1193786	A3	20040303		
	EP 1193786	B1	20070425		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	JP 2002110163	A	20020412	JP 2000-301401	20000929 <--
	US 20020061274	A1	20020523	US 2001-965273	20010927 <--
	US 6797431	B2	20040928		
	TW 519776	B	20030201	TW 2001-90123924	20010927 <--
	MX 2001009738	A	20040812	MX 2001-9738	20010927 <--
	CN 1349265	A	20020515	CN 2001-142532	20010929 <--
	CN 1180494	C	20041215		
PRAI	JP 2000-301401	A	20000929	<--	

AB A LiFePO₄ carbon composite material is to be synthesized in a single phase satisfactorily to achieve superior cell characteristics. In preparing a cathode active material, starting materials for synthesis of a compound represented by the general formula Li_xFePO₄, where 0 < x ≤ 1, are mixed, milled and a carbon material is added to the resulting mass at an optional time point in the course of mixing, milling and sintering. Li₃PO₄, Fe₃(PO₄)₂ or its hydrates Fe₃(PO₄)₂·nH₂O, where n denotes the number of hydrates, are used as the starting materials for synthesis of Li_xFePO₄. The temperature of a product from the sintering is set to 305° or less when the product from the sintering is exposed to atmospheric. The oxygen concentration in a sintering atmospheric is set to 1012 ppm in volume or less at the time point of sintering.

IC ICM H01M0004-58

ICS H01M0010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST battery cathode lithium iron phosphate carbon

- composite
IT Secondary batteries
 (lithium; nonaq. electrolyte battery
 cathode active material capable of reversibly doping/undoping
 lithium)
- IT Battery cathodes
Composites
Sintering
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)
- IT Carbon black, uses
Carbonaceous materials (technological products)
RL: DEV (Device component use); MOA (Modifier or additive use); USES
(Uses)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)
- IT Fluoropolymers, uses
RL: MOA (Modifier or additive use); USES (Uses)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)
- IT Ball milling
 (planetary; nonaq. electrolyte battery
 cathode active material capable of reversibly doping/undoping
 lithium)
- IT 10028-23-6, Phosphoric acid, iron(2+) salt (2:3) octahydrate
30377-52-3, Lithium phosphate 14940-41-1, Iron phosphate
fe3(po4)2 31096-55-6
RL: CPS (Chemical process); PEP (Physical, engineering or chemical
process); PROC (Process)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)
- IT 96-49-1, Ethylene carbonate 108-32-7, Propylene
carbonate 616-38-6, Dimethyl carbonate 7439-93-2,
Lithium, uses 7782-42-5, Graphite, uses 21324-40-3,
Lithium hexafluorophosphate
RL: DEV (Device component use); USES (Uses)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)
- IT 872-36-6, Vinylene carbonate 7440-44-0, Carbon
, uses 9011-17-0, Hexafluoropropylene-vinylidene fluoride
copolymer 24937-79-9, Poly(vinylidene fluoride)
RL: DEV (Device component use); MOA (Modifier or additive use); USES
(Uses)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)
- IT 35365-14-7P, Iron lithium phosphate feipo4 198782-39-7P, Iron
lithium phosphate (FeLiO-1(PO4))
RL: DEV (Device component use); SPN (Synthetic preparation); PREP
(Preparation); USES (Uses)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)
- IT 7782-44-7, Oxygen, uses
RL: TEM (Technical or engineered material use); USES (Uses)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)
- IT 30377-52-3, Lithium phosphate
RL: CPS (Chemical process); PEP (Physical, engineering or chemical
process); PROC (Process)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)

RN 10377-52-3 HCAPLUS
 CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●₃ Li

IT 7782-42-5, Graphite, uses
 RL: DEV (Device component use); USES (Uses)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)
 RN 7782-42-5 HCAPLUS
 CN Graphite (CA INDEX NAME)

c

IT 7440-44-0, Carbon, uses
 RL: DEV (Device component use); MOA (Modifier or additive use); USES
 (Uses)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)
 RN 7440-44-0 HCAPLUS
 CN Carbon (CA INDEX NAME)

c

IT 15365-14-7P, Iron lithium phosphate felipo4
 RL: DEV (Device component use); SPN (Synthetic preparation); PREP
 (Preparation); USES (Uses)
 (nonaq. electrolyte battery cathode
 active material capable of reversibly doping/undoping lithium)
 RN 15365-14-7 HCAPLUS
 CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

RE.CNT 1 THERE ARE 1 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 20 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2002:253127 HCAPLUS [Full-text](#)

DN 136:281937

TI Nonaqueous electrolyte battery with cathode
active material capable of reversibly doping/undoping lithium

IN Hosoya, Mamoru; Takahashi, Kimio; Fukushima, Yuzuru

PA Sony Corporation, Japan

SO Eur. Pat. Appl., 16 pp.

CODEN: EPXXDW

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1193785	A2	20020403	EP 2001-122769	20010921 <--
	EP 1193785	A3	20040303		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	JP 2002110164	A	20020412	JP 2000-301402	20000929 <--
	US 20020059719	A1	20020523	US 2001-956514	20010919 <--
	US 7101521	B2	20060905		
	TW 513823	B	20021211	TW 2001-90123221	20010920 <--
	MX 2001009681	A	20020412	MX 2001-9681	20010926 <--
	CN 1346159	A	20020424	CN 2001-138523	20010928 <--
	CN 1223028	C	20051012		
	KR 835127	B1	20080605	KR 2001-60520	20010928 <--
PRAI	JP 2000-301402	A	20000929	<--	

AB A LiFePO₄ carbon composite material is to be synthesized in a single phase satisfactorily to prevent the deterioration of the performance of the cathode active material from occurring and achieve superior cell characteristics. In preparing a cathode active material, starting materials for synthesis of a compound represented by the general formula Li_xFePO₄, where 0 < x ≤ 1, are mixed, milled and a carbon material is added to the resulting mass at an optional time point in the course of mixing, milling and sintering. Li₃PO₄, Fe₃(PO₄)₂ or its hydrates Fe₃(PO₄)₂·nH₂O, where n denotes the number of hydrates, are used as the starting materials for synthesis of Li_xFePO₄. The temperature of a product from the sintering is set to 305° or less when the product from the sintering is exposed to atmospheric

ICM H01M0004-58

ICS H01M0010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST battery cathode lithium iron phosphate carbon

composite

IT Secondary batteries

(lithium; nonaq. electrolyte battery with
cathode active material capable of reversibly doping/undoping
lithium)

IT Battery cathodes

Composites

(nonaq. electrolyte battery with cathode
active material capable of reversibly doping/undoping lithium)

IT Carbonaceous materials (technological products)

RL: DEV (Device component use); USES (Uses)

(nonaq. electrolyte battery with cathode

active material capable of reversibly doping/undoping lithium)

IT Fluoropolymers, uses

- RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
 (nonaq. electrolyte battery with cathode
 active material capable of reversibly doping/undoping lithium)
- IT Ball milling
 (planetary; nonaq. electrolyte battery with
 cathode active material capable of reversibly doping/undoping
 lithium)
- IT 10377-52-3, Lithium phosphate li3po4 14940-41-1, Iron phosphate
 fe3(po4)2 31096-55-6
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical
 process); PROC (Process)
 (nonaq. electrolyte battery with cathode
 active material capable of reversibly doping/undoping lithium)
- IT 96-49-1, Ethylene carbonate 108-32-7, Propylene
 carbonate 616-38-6, Dimethyl carbonate 872-36-6,
 Vinylene carbonate 7439-93-2, Lithium, uses 7782-42-5
 , Graphite, uses 9011-17-0, Hexafluoropropylene-vinylidene
 fluoride copolymer 21324-40-3, Lithium hexafluorophosphate
 RL: DEV (Device component use); USES (Uses)
 (nonaq. electrolyte battery with cathode
 active material capable of reversibly doping/undoping lithium)
- IT 7440-44-0, Carbon, uses 24937-79-9, Pvd
 RL: DEV (Device component use); MOA (Modifier or additive use); USES
 (Uses)
 (nonaq. electrolyte battery with cathode
 active material capable of reversibly doping/undoping lithium)
- IT 15365-14-7P, Iron lithium phosphate FeLiPO4 198782-39-7P, Iron
 lithium phosphate (FeLiO-1(PO4))
 RL: DEV (Device component use); SPN (Synthetic preparation); PREP
 (Preparation); USES (Uses)
 (nonaq. electrolyte battery with cathode
 active material capable of reversibly doping/undoping lithium)
- IT 10377-52-3, Lithium phosphate li3po4
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical
 process); PROC (Process)
 (nonaq. electrolyte battery with cathode
 active material capable of reversibly doping/undoping lithium)
- RN 10377-52-3 HCAPLUS
- CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

- IT 7782-42-5, Graphite, uses
 RL: DEV (Device component use); USES (Uses)
 (nonaq. electrolyte battery with cathode
 active material capable of reversibly doping/undoping lithium)
- RN 7782-42-5 HCAPLUS
- CN Graphite (CA INDEX NAME)

C

IT 7440-44-0, Carbon, uses
 RL: DEV (Device component use); MOA (Modifier or additive use); USES
 (Uses)
 (nonaq. electrolyte battery with cathode
 active material capable of reversibly doping/undoping lithium)
 RN 7440-44-0 HCAPLUS
 CN Carbon (CA INDEX NAME)

C

IT 15365-14-7P, Iron lithium phosphate FeLiPO4
 RL: DEV (Device component use); SPN (Synthetic preparation); PREP
 (Preparation); USES (Uses)
 (nonaq. electrolyte battery with cathode
 active material capable of reversibly doping/undoping lithium)
 RN 15365-14-7 HCAPLUS
 CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 21 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2002:169249 HCAPLUS Full-text

DN 136:203096

TI Method for preparation of cathode active material for nonaqueous
 electrolyte battery

IN Hosoya, Mamoru; Takahashi, Kimio; Fukushima, Yuzuru

PA Sony Corporation, Japan

SO Eur. Pat. Appl., 21 pp.

CODEN: EPXXDW

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----		-----	-----	-----
PI	EP 1184920	A2	20020306	EP 2001-120637	20010830 <--
	EP 1184920	A3	20040303		

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,

IE, SI, LT, LV, FI, RO

JP 2002075364	A	20020315	JP 2000-261277	20000830 <--
JP 4151210	B2	20080917		
TW 518785	B	20030121	TW 2001-90121059	20010827 <--
MX 2001008733	A	20040812	MX 2001-8733	20010829 <--
KR 816272	B1	20080325	KR 2001-52393	20010829 <--
CN 1340869	A	20020320	CN 2001-135562	20010830 <--
CN 1199302	C	20050427		

PRAI JP 2000-261277 A 20000830 <--

AB A cathode active material improved in electron conductivity and a non-aqueous electrolyte cell employing this cathode active material and which is improved in cell capacity and cyclic characteristics are disclosed. The cathode active material is composed of a compound having the general formula Li_xFePO_4 where $0 < x \leq 1.0$, and a carbon material, with the carbon content per unit weight being not less than 3 wt% and with the powder d. being not lower than 2.2 g/cm³.

IC ICM H01M0004-58
ICS H01M0004-62; H01M0004-04

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST cathode active material prepn nonaq electrolyte battery

IT Secondary Batteries
(lithium; method for preparation of cathode active material for nonaq. electrolyte battery)

IT Battery cathodes
Sintering
(method for preparation of cathode active material for nonaq. electrolyte battery)

IT Carbonaceous materials (technological products)
Fluoropolymers, uses
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(method for preparation of cathode active material for nonaq. electrolyte battery)

IT Carbon black, uses
RL: MOA (Modifier or additive use); USES (Uses)
(method for preparation of cathode active material for nonaq. electrolyte battery)

IT 10045-86-0, Phosphoric acid, iron(3+) salt (1:1) 10377-52-3, Lithium phosphate
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(method for preparation of cathode active material for nonaq. electrolyte battery)

IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 7439-93-2, Lithium, uses 21324-40-3, Lithium hexafluorophosphate
RL: DEV (Device component use); USES (Uses)
(method for preparation of cathode active material for nonaq. electrolyte battery)

IT 24937-79-9, PvdF
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(method for preparation of cathode active material for nonaq. electrolyte battery)

IT 15365-14-7E, Iron lithium phosphate FeLiPO_4 198782-39-7P, Iron lithium phosphate ($\text{FeLiO-l(PO}_4\text{)})$
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(method for preparation of cathode active material for nonaq.

electrolyte battery)
 IT 7440-44-0, Carbon, uses
 RL: MOA (Modifier or additive use); USES (Uses)
 (method for preparation of cathode active material for nonaq.
 electrolyte battery)
 IT 10377-52-3, Lithium phosphate
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical
 process); PROC (Process)
 (method for preparation of cathode active material for nonaq.
 electrolyte battery)
 RN 10377-52-3 HCAPLUS
 CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●₃ Li

IT 15365-14-7P, Iron lithium phosphate FeLiPO4
 RL: DEV (Device component use); SPN (Synthetic preparation); PREP
 (Preparation); USES (Uses)
 (method for preparation of cathode active material for nonaq.
 electrolyte battery)
 RN 15365-14-7 HCAPLUS
 CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

IT 7440-44-0, Carbon, uses
 RL: MOA (Modifier or additive use); USES (Uses)
 (method for preparation of cathode active material for nonaq.
 electrolyte battery)
 RN 7440-44-0 HCAPLUS
 CN Carbon (CA INDEX NAME)

c

RE.CNT 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 22 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN
 AN 2002:138998 HCAPLUS Full-text
 DN 136:186643
 TI Nonaqueous electrolyte secondary battery
 IN Atsumi, Yoshinori; Yamamoto, Masahiro; Ohta, Yasuo
 PA Sony Corporation, Japan
 SO Eur. Pat. Appl., 11 pp.
 CODEN: EPXXDW

DT Patent
 LA English
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	----	-----	-----	-----
PI	EP 1180811	A2	20020220	EP 2001-119842	20010816 <--
	EP 1180811	A3	20031126		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	JP 2002134112	A	20020510	JP 2001-228239	20010727 <--
	JP 3826746	B2	20060927		
	US 20050053835	A1	20050310	US 2001-932050	20010817 <--
	US 20080032195	A1	20080207	US 2007-736822	20070418 <--
PRAI	JP 2000-248672	A	20000818	<--	
	JP 2001-228239	A	20010727	<--	
	US 2001-932050	A1	20010817	<--	
AB	A nonaq. electrolyte secondary cell including: a cathode containing a compound expressed by a general formula $AxMyPO_4$ (wherein A represents an alkali metal and M represents a transition element, which are contained in ranges: $0 < x \leq 2$ and $1 \leq y \leq 2$); an anode containing sintered carbon material prepared by sintering a carbon material capable of doping/dedoping lithium; and a nonaq. electrolyte solution. This nonaq. electrolyte secondary cell can exhibit a high temperature storage characteristic and a high capacity.				
IC	ICM H01M0004-58 ICS H01M0010-40				
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology)				
ST	lithium battery nonaq electrolyte secondary				
IT	Secondary batteries (lithium; nonaq. electrolyte secondary battery)				
IT	Battery cathodes (nonaq. electrolyte secondary battery)				
IT	Carbonaceous materials (technological products) RL: DEV (Device component use); USES (Uses) (nonaq. electrolyte secondary battery)				
IT	Carbon black, uses RL: MOA (Modifier or additive use); USES (Uses) (nonaq. electrolyte secondary battery)				
IT	Fluoropolymers, uses RL: TEM (Technical or engineered material use); USES (Uses) (nonaq. electrolyte secondary battery)				
IT	554-13-2, Lithium carbonate 7783-28-0, Diammonium hydrogen phosphate 14567-67-0, Vivianite RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process) (nonaq. electrolyte secondary battery)				
IT	108-32-7, Propylene carbonate 623-53-0, Ethyl methyl carbonate 7429-90-5, Aluminum, uses 7440-44-0, Carbon, uses 21324-40-3, Lithium hexafluorophosphate RL: DEV (Device component use); USES (Uses) (nonaq. electrolyte secondary battery)				
IT	15365-14-7P, Iron lithium phosphate $FeLiPO_4$ 22831-39-6P,				

Magnesium silicide (Mg₂Si)

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(nonaq. electrolyte secondary battery)

IT 7440-44-0, Carbon, uses

RL: DEV (Device component use); USES (Uses)

(nonaq. electrolyte secondary battery)

RN 7440-44-0 HCAPLUS

CN Carbon (CA INDEX NAME)

C

IT 15365-14-7P, Iron lithium phosphate FeLiP04

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(nonaq. electrolyte secondary battery)

RN 15365-14-7 HCAPLUS

CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 23 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2001:179635 HCAPLUS [Full-text](#)

DN 134:210518

TI Process for large scale fabrication of lithium polymer
batteries with solid electrolytes in the film
technology

IN Meislitzer, Karl Heinz

PA Bangert, Wolfgang, Germany; Sebastian, Rudolf

SO Ger. Offen., 12 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
FI	DE 19941861	A1	20010315	DE 1999-19941861	19990902 <--
PRAI	DE 1999-19941861		19990902 <--		

AB Films for cathodes and anodes as well as for the electrolytes are pulled from
pastes of suitable composition and preparation Cathode pastes are prepared
from: 3-10% polymer or copolymer, PEO, polystyrene, polyvinyl chloride.

polyvinylidene fluoride, or polyvinylidene fluoride-hexafluoropropylene copolymer (PVDF-HFP); 4-12% plasticizer (e.g., dibutylphthalate or dioctyl phthalate); 20-60 g% intercalation material (e.g., LiCoO_2 , LiNiO_2 , $\text{LiCoNi}_{1-x}\text{O}_2$, LiMn_2O_4 or VOx); 2-10% elec. conductor (e.g., graphite powder or amorphous C); and 40-80% solvent (e.g., acetone). Anode paste comprises: 3-10% polymer or copolymer (e.g., PEO, polystyrene, PVC, PVDF, or PVDF-HFP copolymer), 4-12% plasticizer (di-Bu phthalate or dioctyl phthalate), 20-40% elec. conductor (graphite powder or amorphous C), and 40-80% solvent (acetone). The electrolyte paste comprises: 3-10 g% polymer or copolymer (PEO, polystyrene, PVC, PVDF or hexafluoropropylene-vinylidene fluoride copolymer), 4-12% plasticizer (DBP or DOP), 20-40% ionic conductor ($\text{Li}_9\text{AlSiO}_8$, $\text{Li}_{1.3}\text{Al}_{1.0}\text{Ti}_{1.7}(\text{PO}_4)_3$, $\text{LiTi}_2(\text{PO}_4)_3$, Li_2O or $\text{Li}_4\text{SiO}_4\cdot\text{Li}_3\text{PO}_4$), 2-10% ionic conductor (LiClO_4 , LiBF_4 , LiCl , LiBr , or LiI) and 40-80 g% solvent (acetone).

IC ICM H01M0004-04

ICS H01M0004-62; H01M0004-48

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

ST lithium polymer electrolyte battery prodn
film technol

IT Polyurethanes, uses

RL: TEM (Technical or engineered material use); USES (Uses)
(acrylates, coatings; process for large scale fabrication of
lithium polymer batteries with solid
electrolytes in film technol.)

IT Secondary batteries

(lithium; process for large scale fabrication of lithium
polymer batteries with solid
electrolytes in film technol.)

IT Battery anodes

Battery cathodes

Films

(process for large scale fabrication of lithium polymer
batteries with solid electrolytes in film
technol.)

IT Fluoropolymers, uses

Polyoxyalkylenes, uses

RL: DEV (Device component use); USES (Uses)
(process for large scale fabrication of lithium polymer
batteries with solid electrolytes in film
technol.)

IT 7440-44-0, Carbon, uses

RL: MOA (Modifier or additive use); USES (Uses)
(amorphous; process for large scale fabrication of lithium
polymer batteries with solid
electrolytes in film technol.)

IT 7440-50-8, Copper, uses

RL: DEV (Device component use); USES (Uses)
(film, current collector; process for large scale fabrication of
lithium polymer batteries with solid
electrolytes in film technol.)

IT 84-74-2, Dibutyl phthalate 117-84-0, Dioctyl phthalate

RL: DEV (Device component use); USES (Uses)
(plasticizer; process for large scale fabrication of lithium
polymer batteries with solid
electrolytes in film technol.)

IT 9002-86-2, Polyvinyl chloride 9003-53-6, Polystyrene 9011-17-0,

Hexafluoropropylene-vinylidene fluoride copolymer 11099-11-9,
Vanadium oxide 12031-65-1, Lithium nickel oxide 12057-17-9,
Lithium manganese oxide 12190-79-3, Cobalt lithium oxide 12012-
24937-79-9, Polyvinylidene fluoride 25322-68-3, PEO 131344-56-4,

Cobalt lithium nickel oxide

RL: DEV (Device component use); USES (Uses)

(process for large scale fabrication of lithium polymer
batteries with solid electrolytes in film
technol.)

IT 7447-41-8, Lithium chloride, uses 7550-35-8, Lithium bromide
7791-03-9, Lithium perchlorate 10377-51-2, Lithium iodide 14283-07-9,
Lithium tetrafluoroborate 30622-39-0, Lithium titanium phosphate
LiTi2(PO4)3 120479-61-0, Aluminum lithium titanium phosphate
Al0.3Li1.3Ti1.7(PO4)3 138728-82-2, Lithium phosphate silicate
(Li3.5(PO4)0.5(SiO4)0.5) 180728-17-0, Aluminum lithium oxide silicate
(AlLi9O4(SiO4)) 328899-26-9, Lithium titanium oxide phosphate
(Li3Ti2O(PO4)3)

RL: DEV (Device component use); MOA (Modifier or additive use); USES
(Uses)

(process for large scale fabrication of lithium polymer
batteries with solid electrolytes in film
technol.)

IT 7782-42-5, Graphite, uses

RL: MOA (Modifier or additive use); USES (Uses)

(process for large scale fabrication of lithium polymer
batteries with solid electrolytes in film
technol.)

IT 67-64-1, Acetone, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(process for large scale fabrication of lithium polymer
batteries with solid electrolytes in film
technol.)

IT 7440-44-0, Carbon, uses

RL: MOA (Modifier or additive use); USES (Uses)

(amorphous; process for large scale fabrication of lithium
polymer batteries with solid
electrolytes in film technol.)

RN 7440-44-0 HCAPLUS

CN Carbon (CA INDEX NAME)

C

IT 30622-39-0, Lithium titanium phosphate LiTi2(PO4)3

RL: DEV (Device component use); MOA (Modifier or additive use); USES
(Uses)

(process for large scale fabrication of lithium polymer
batteries with solid electrolytes in film
technol.)

RN 30622-39-0 HCAPLUS

CN Phosphoric acid, lithium titanium(4+) salt (3:1:2) (8CI, 9CI) (CA INDEX
NAME)



● 1/3 Li

● 2/3 Ti(IV)

IT 7782-42-5, Graphite, uses
 RL: MOA (Modifier or additive use); USES (Uses)
 (process for large scale fabrication of lithium polymer
 batteries with solid electrolytes in film
 technol.)
 RN 7782-42-5 HCAPLUS
 CN Graphite (CA INDEX NAME)

C

RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 24 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN
 AN 2000:774123 HCAPLUS Full-text
 DN 133:352634
 TI Electrode materials having increased surface conductivity
 IN Ravet, Nathalie; Besner, Simon; Simoneau, Martin; Vallee, Alain; Armand,
 Michel; Magnan, Jean-francois
 PA Hydro-Quebec, Can.
 SO Eur. Pat. Appl., 22 pp.
 CODEN: EPXXDW
 DT Patent
 LA French
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1049182	A2	20001102	EP 2000-401207	20000502 <--
	EP 1049182	A3	20040211		
	EP 1049182	B1	20080102		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	CA 2270771	A1	20001030	CA 1999-2270771	19990430 <--
	CA 2307119	A1	20001030	CA 2000-2307119	20000428 <--
	CA 2625896	A1	20001030	CA 2000-2625896	20000428 <--
	JP 2001015111	A	20010119	JP 2000-132779	20000501 <--
	EP 1796189	A2	20070613	EP 2007-4289	20000502 <--
	EP 1796189	A3	20070620		
	R: DE, FR, GB, IT				
	US 20020195591	A1	20021226	US 2002-175794	20020621 <--
	US 6855273	B2	20050215		
	US 20040140458	A1	20040722	US 2003-740449	20031222 <--
	US 6962666	B2	20051108		

	US 20060060827	A1	20060323	US 2005-266339	20051104 <--
	US 7344659	B2	20080318		
	US 20080257721	A1	20081023	US 2008-33636	20080219 <--
	JP 2008186807	A	20080814	JP 2008-41303	20080222 <--
PRAI	CA 1999-2270771	A	19990430	<--	
	CA 2000-2307119	A3	20000428	<--	
	US 2000-560572	B1	20000428	<--	
	JP 2000-132779	A3	20000501	<--	
	EP 2000-401207	A3	20000502	<--	
	US 2002-175794	A3	20020621	<--	
	US 2003-740449	A1	20031222		
	US 2005-266339	A3	20051104		
AB	Intercalated electrode materials comprising complex oxides, especially Li oxides, are prepared, suitable for redox reaction by exchange of alkali metal ions (especially Li) and electrons with an electrolyte. The complex oxide electrodes can be used in batteries, supercapacitors or electrochromic light moderators. The complex oxides have the general formula $AaMmZzOoNnFf$, where A is alkali metal (e.g., Li), M is ≥ 1 transition metal (e.g., Fe, Mn, V, Ti, Mo, Nb, Zn, W), Z is ≥ 1 nonmetal (e.g., P, S, Si, Se, As, Ge, B, Sn), and a,m,z,o,n,f are chosen for elec. neutrality. A conductive carbon coating is formed or deposited on the surface of the electrode material, e.g., by pyrolysis of an organic material, hydrocarbons or polymers, for increased surface conductivity				
IC	ICM H01M0004-58 ICS H01M0004-48; H01M0004-62				
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology) Section cross-reference(s): 57, 72, 76				
ST	electrode material carbon coated increased surface cond; battery electrode carbon coated increased surface cond; supercapacitor electrode carbon coated increased surface cond; electrochromic material carbon coated increased surface cond				
IT	Metallic fibers RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses) (aluminum; electrode materials having increased surface conductivity)				
IT	Windows Windows (electrochromic; electrode materials having increased surface conductivity)				
IT	Battery cathodes Capacitor electrodes Electrochromic materials Electrodes Primary batteries Secondary batteries Thermal decomposition (electrode materials having increased surface conductivity)				
IT	Oxides (inorganic), uses Oxynitrides Phosphates, uses Silicates, uses Sulfates, uses RL: DEV (Device component use); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses) (electrode materials having increased surface conductivity)				
IT	Carbon black, uses EPDM rubber RL: DEV (Device component use); TEM (Technical or engineered material				

- use); USES (Uses)
(electrode materials having increased surface conductivity)
- IT Hydrocarbons, reactions
RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(electrode materials having increased surface conductivity)
- IT Organic compounds, reactions
RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(electrode materials having increased surface conductivity)
- IT Polymers, reactions
RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(electrode materials having increased surface conductivity)
- IT Polyolefins
RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(electrode materials having increased surface conductivity)
- IT Polysaccharides, reactions
RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(electrode materials having increased surface conductivity)
- IT Polyoxalkylenes, uses
RL: NUU (Other use, unclassified); TEM (Technical or engineered material use); USES (Uses)
(electrolytes; electrode materials having increased surface conductivity)
- IT Primary batteries
Secondary batteries
(lithium; electrode materials having increased surface conductivity)
- IT Fluorides, uses
RL: DEV (Device component use); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(oxyfluorides; electrode materials having increased surface conductivity)
- IT Electrolytic capacitors
(supercapacitors; electrode materials having increased surface conductivity)
- IT Electrochromic devices
Electrochromic devices
(windows; electrode materials having increased surface conductivity)
- IT 7440-44-0P, Carbon, uses 15365-14-7P, Iron
lithium phosphate (FeLiPO4) 30734-08-8P, Lithium manganese silicate
Li2MnSiO4 39302-37-9P, Lithium titanium oxide 180984-63-8P, Lithium
magnesium titanium oxide 252943-50-3P, Lithium vanadium phosphate
silicate Li3.5V2(PO4)2.5(SiO4)0.5 304905-30-4P 304905-31-5P, Iron
lithium fluoride (FeLi0.2F3) 304905-32-6P, Lithium manganese nitride
oxide (Li3MnNO) 304905-33-7P 304905-34-8P 304905-35-9P, Lithium
magnesium titanium oxide (Li3.5Mg0.5Ti4O12) 304905-36-0P, Iron lithium
phosphorus silicon oxide 304905-37-1P 304905-38-2P, Iron lithium
phosphorus fluoride oxide 304905-39-3P 304905-40-6P 304905-41-7P
304905-42-8P
RL: DEV (Device component use); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(electrode materials having increased surface conductivity)
- IT 1314-35-8, Tungsten oxide WO3, uses 7782-42-5, Graphite
, uses 50926-11-9, Indium tin oxide 65324-39-2, Celgard 2400
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(electrode materials having increased surface conductivity)

- IT 1333-74-0, Hydrogen, uses 7440-37-1, Argon, uses 7440-59-7, Helium, uses 7727-37-9, Nitrogen, uses 7782-44-7, Oxygen, uses
 RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
 (electrode materials having increased surface conductivity)
- IT 78-10-4 109-72-8, Butyl lithium, uses 546-68-9 553-91-3, Lithium oxalate 554-13-2, Lithium carbonate 1310-65-2, Lithium hydroxide 1344-43-0, Manganese oxide MnO, uses 5931-89-5, Cobalt acetate 5965-38-8, Cobalt oxalate dihydrate 6108-17-4, Lithium acetate dihydrate 6156-78-1, Manganese acetate tetrahydrate 6556-16-7, Manganese oxalate dihydrate 7722-76-1, Ammonium dihydrogen phosphate 7783-50-8, Iron fluoride FeF₃ 7803-55-6, Ammonium vanadate 9003-01-4, Polyacrylic acid 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 10028-22-5, Ferric sulfate 10102-24-6, Lithium silicate Li₂SiO₃ 10377-52-3, Lithium phosphate Li₃PO₄ 13463-10-0, Ferric phosphate dihydrate 14567-67-0, Vivianite 16674-78-5, Magnesium acetate tetrahydrate 25656-42-2, Lithium polyacrylate 26134-62-3, Lithium nitride 145673-07-0
 RL: NUU (Other use, unclassified); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)
 (electrode materials having increased surface conductivity)
- IT 304905-43-9 305324-61-2
 RL: NUU (Other use, unclassified); TEM (Technical or engineered material use); USES (Uses)
 (electrode materials having increased surface conductivity)
- IT 57-50-1, reactions 77-47-4, Hexachlorocyclopentadiene 98-00-0D, Furfuryl alcohol, derivs., polymers 100-42-5D, Styrene, derivs., polymers 107-13-1D, Acrylonitrile, derivs., polymers 108-05-4D, Vinyl acetate, derivs., polymers 108-95-2D, Phenol, derivs., polymers, reactions 115-07-1, 1-Propene, reactions 120-12-7, Anthracene, reactions 128-69-8D, 3,4,9,10-Perylenetetracarboxylic acid dianhydride, polymers with Jeffamine 600 198-55-0D, Perylene, derivs., polymers 630-08-0, Carbon monoxide, reactions 996-70-3, Tetrakis(dimethylamino)ethylene 1321-74-0D, Divinylbenzene, derivs., polymers 6674-22-2, DBU 9002-88-4 9002-89-5 9003-07-0, Polypropylene 9003-17-2D, Polybutadiene, derivs. 9004-34-6D, Cellulose, derivs., reactions 9004-35-7, Cellulose acetate 9005-25-8D, Starch, derivs., reactions 15133-82-1, Tetrakis(triphenylphosphine)nickel 25014-41-9, Polyacrylonitrile 51736-72-2, Polyvinylidene bromide 157889-12-8, Jeffamine ED 600-perylenetetracarboxylic acid dianhydride copolymer
 RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
 (electrode materials having increased surface conductivity)
- IT 75-05-8, Acetonitrile, uses 96-48-0, γ -Butyrolactone 96-49-1, Ethylene carbonate 110-71-4 616-38-6, Dimethyl carbonate 646-06-0, Dioxolane 2832-49-7, Tetraethylsulfamide 21324-40-3, Lithium hexafluorophosphate LiPF₆ 25322-68-3 66950-70-7 90076-65-6, Lithium bis(trifluoromethanesulfonyl)imide
 RL: NUU (Other use, unclassified); TEM (Technical or engineered material use); USES (Uses)
 (electrolytes; electrode materials having increased surface conductivity)
- IT 7429-90-5, Aluminum, uses
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
 (foils, grills; electrode materials having increased surface conductivity)
- IT 7439-93-2, Lithium, uses

RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
 (foils; electrode materials having increased surface conductivity)

IT 7440-50-8, Copper, uses
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
 (grills; electrode materials having increased surface conductivity)

IT 7440-02-0, Nickel, uses
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
 (substrates; electrode materials having increased surface conductivity)

IT 7440-44-0P, Carbon, uses 15365-14-7P, Iron
 lithium phosphate (FeLiPO₄)
 RL: DEV (Device component use); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
 (electrode materials having increased surface conductivity)

RN 7440-44-0 HCAPLUS
 CN Carbon (CA INDEX NAME)

c

RN 15365-14-7 HCAPLUS
 CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

IT 7782-42-5, Graphite, uses
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
 (electrode materials having increased surface conductivity)

RN 7782-42-5 HCAPLUS
 CN Graphite (CA INDEX NAME)

c

IT 10377-52-3, Lithium phosphate Li₃PO₄
 RL: NUU (Other use, unclassified); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)
 (electrode materials having increased surface conductivity)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



● Li

RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 25 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2000:723264 HCAPLUS Full-text

DN 133:298787

TI Composite electrode comprising two interpenetrating
solid electrolytes

IN Besner, Simon; Armand, Michel; Magnan, Jean-Francois; Belanger, Andre;
Gauthier, Michel; Dupuis, Elisabeth

PA Hydro-Quebec, Can.

SO Eur. Pat. Appl., 21 pp.

CODEN: EPXXDW

DT Patent

LA French

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1043787	A2	20001011	EP 2000-420064	20000404 <--
	EP 1043787	A3	20060517		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL				
	CA 2268316	A1	20001007	CA 1999-2268316	19990407 <--
	CA 2268316	C	20030923		
	JP 2000348711	A	20001215	JP 2000-106151	20000407 <--
PRAI	CA 1999-2268316	A	19990407	<--	

AB A composite electrode is disclosed in which 2 solid electrolytes are penetrated. The 1st electrolyte is an organic compound consisting of a dry or gelified polymer, providing a conductor by dissoln. of a salt (preferably a Li-containing salt), and acting as a deformable binder. The 2nd electrolyte is a mineral material (preferably a vitreous material) which is a conductor for Li+ ions and in which components of the 1st electrolyte are insol. The mineral electrolyte is used in the form of an aqueous solution or a water-light alc. mixture and is contacted with the electrodes in a dispersed form to wet solid phases of the composite (i.e., active mass of the electrode, electronic conduction additive, and a current collector). The organic electrolyte contains a polymer which is introduced into a porous mineral by impregnation to form the composite electrode.

IC ICM H01M0004-02

ICS H01M0004-62; H01M0010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST composite battery electrode interpenetrating

solid electrolyte

IT Battery electrodes

Battery electrolytes

(composite electrode comprising two interpenetrating
solid electrolytes)

IT Carbon black, uses
 RL: DEV (Device component use); USES (Uses)
 (conductive additive in composite electrode comprising two
 interpenetrating solid electrolytes)

IT Polyoxyalkylenes, uses
 RL: TEM (Technical or engineered material use); USES (Uses)
 (lithium complex; in battery solid
 electrolytes)

IT 7440-22-4, Silver, uses
 RL: DEV (Device component use); USES (Uses)
 (conduction additive for composite electrode comprising two
 interpenetrating solid electrolytes)

IT 7782-42-5, Graphite, uses
 RL: DEV (Device component use); USES (Uses)
 (conductive additive in composite electrode comprising two
 interpenetrating solid electrolytes)

IT 7429-90-5, Aluminum, uses 7440-50-8, Copper, uses
 RL: DEV (Device component use); USES (Uses)
 (current collector for composite electrode comprising two
 interpenetrating solid electrolytes)

IT 10377-52-3, Lithium phosphate 12676-27-6 12712-38-8, Potassium
 borate 13762-75-9 16068-46-5, Potassium phosphate
 RL: TEM (Technical or engineered material use); USES (Uses)
 (in battery electrolyte)

IT 96-49-1, Ethylene carbonate 2832-49-7, Tetraethyl sulfamide
 7439-93-2D, Lithium, polyethylene oxide complex, uses 21324-40-3,
 Lithium hexafluorophosphate 25322-68-3D, Polyethylene oxide, lithium
 complex 90076-65-6 111804-95-6
 RL: TEM (Technical or engineered material use); USES (Uses)
 (in battery solid electrolytes)

IT 1314-62-1, Vanadium oxide, uses 15365-14-7
 RL: DEV (Device component use); USES (Uses)
 (in composite electrode comprising two interpenetrating
 solid electrolytes)

IT 7782-42-5, Graphite, uses
 RL: DEV (Device component use); USES (Uses)
 (conductive additive in composite electrode comprising two
 interpenetrating solid electrolytes)

RN 7782-42-5 HCAPLUS

CN Graphite (CA INDEX NAME)

c

IT 10377-52-3, Lithium phosphate
 RL: TEM (Technical or engineered material use); USES (Uses)
 (in battery electrolyte)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)

●₃ Li

IT 15365-14-7

RL: DEV (Device component use); USES (Uses)

(in composite electrode comprising two interpenetrating solid electrolytes)

RN 15365-14-7 HCAPLUS

CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (9CI) (CA INDEX NAME)



● Fe(II)

● Li

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 26 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 2000:194257 HCAPLUS [Full-text](#)

DN 132:317296

TI Solid-electrolyte thick-film gas sensor prepared by sol-gel method

AU Shimizu, Yoichi; Soda, Takeshi

CS Department of Applied Chemistry, Faculty of Engineering, Kyushu Institute of Technology, Tobata, Kitakyushu, 804-8550, Japan

SO Chemical Sensors (1999), 15(Suppl. B, Proceedings of the 29th Chemical Sensor Symposium, 1999), 67-69

CODEN: KAGSEU

PB Denki Kagakkai Kagaku Sensa Kenkyukai

DT Journal

LA Japanese

AB A planar-type solid-state electrochem. gas sensor using an Na-ion conductor (NASICON) thick-film and a perovskite-type thin-film electrode could be prepared by novel sol-gel methods using aqueous complex and/or polymer-based precursors. NASICON thin-film could be fabricated onto alumina substrates by spin-coating a tartaric acid-based gel, drying at 150°C, and sintering at 1000°C for 3h. Preparation of perovskite-type oxide thin-films at 5000C was also developed by the use of PVA-acetylacetone polymer precursor. The sensor device combined with LaNiO₃ and NASICON thin-film showed high sensitivity to CO₂ at 300-4000C. The 90% response time to 1000 ppm CO₂ was as short as 10-30 s at 300-400°C.

CC 79-2 (Inorganic Analytical Chemistry)

Section cross-reference(s): 72

ST solid electrolyte thick film gas sensor
 IT Gas analysis
 Sol-gel processing
 (solid-electrolyte thick-film gas sensor prepared by
 sol-gel method)
 IT Gas sensors
 (solid-state; solid-electrolyte
 thick-film gas sensor prepared by sol-gel method)
 IT 124-38-9, Carbon dioxide, analysis
 RL: ANT (Analyte); ANST (Analytical study)
 (solid-electrolyte thick-film gas sensor prepared by
 sol-gel method)
 IT 87-69-4, Tartaric acid, analysis
 RL: ARU (Analytical role, unclassified); ANST (Analytical study)
 (solid-electrolyte thick-film gas sensor prepared by
 sol-gel method)
 IT 1344-28-1, Alumina, uses 9002-89-5, PVA 12016-86-3, Cobalt lanthanum
 trioxide 12031-18-4, Lanthanum Nickel trioxide 77641-62-4, (
 NASICON
 RL: DEV (Device component use); USES (Uses)
 (solid-electrolyte thick-film gas sensor prepared by
 sol-gel method)
 IT 123-54-6, Acetylacetone, reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (solid-electrolyte thick-film gas sensor prepared by
 sol-gel method)
 IT 77641-62-4, (NASICON
 RL: DEV (Device component use); USES (Uses)
 (solid-electrolyte thick-film gas sensor prepared by
 sol-gel method)
 RN 77641-62-4 HCAPLUS
 CN Nasicon (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L108 ANSWER 27 OF 28 HCAPLUS COPYRIGHT 2009 ACS on STN

AN 1998:221666 HCAPLUS [Full-text](#)

DN 129:20826

OREF 129:4335a,4338a

TI New cathode materials for rechargeable lithium batteries
 : the 3-D framework structures $\text{Li}_3\text{Fe}_2(\text{XO}_4)_3$ (X = P, As)

AU Masquelier, C.; Padhi, A. K.; Nanjundaswamy, K. S.; Goodenough,
 J. B.

CS Center for Materials Science and Engineering, University of Texas at
 Austin, Austin, TX, 78712-1063, USA

SO Journal of Solid State Chemistry (1998), 135(2), 228-234
 CODEN: JSSCBI; ISSN: 0022-4596

PB Academic Press

DT Journal

LA English

AB Electrochem. insertion of lithium into four $\text{Li}_3\text{Fe}_2(\text{XO}_4)_3$ polymorphs (X = P or As) with 3-D framework structures was carried out in "Li/LiClO₄ (PC:DME)/cathode" coin cells. Approx. 2 Li per formula unit could be reversibly inserted into the three different structures, which corresponds to the reduction of all Fe^{3+} to Fe^{2+} between 2.5 and 3.5 V vs lithium. The position of the $\text{Fe}^{3+}/\text{Fe}^{2+}$ redox couple below the lithium-anode Fermi energy is nearly independent of the structure and of whether X = P or As. There is, however, a clear dependence of (i) the shape of the V_{cc} vs x curves for $\text{Li}_3\text{xFe}_2(\text{XO}_4)_3$ and (ii) the charge-discharge rate capabilities on the crystal structure of the cathode material.

- CC 72-2 (Electrochemistry)
Section cross-reference(s): 52, 56
- ST rechargeable lithium battery cathode electrochem
insertion; ionic conductor iron phosphate arsenate structure
- IT Electric charge
(electrochem. charge-discharge curves for the first cycle of lithium
iron phosphate/arsenate cathodes)
- IT Current density
(in comparison of capacities for polymorphs $\text{Li}_3\text{Fe}_2(\text{PO}_4)_3$
cathode materials for rechargeable lithium batteries)
- IT Carbon black, uses
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(in formation of $\text{Li}_3\text{Fe}_2(\text{XO}_4)_3$ (X = P, As) cathode for
rechargeable lithium batteries)
- IT Fluoropolymers, uses
RL: NUU (Other use, unclassified); PRP (Properties); USES (Uses)
(in formation of $\text{Li}_3\text{Fe}_2(\text{XO}_4)_3$ (X = P, As) cathode for
rechargeable lithium batteries)
- IT Battery cathodes
Secondary batteries
(new cathode materials for rechargeable lithium
batteries: 3-D framework structures $\text{Li}_3\text{Fe}_2(\text{XO}_4)_3$ (X = P, As))
- IT Oxidation, electrochemical
(of Fe^{2+} in lithium iron phosphate and arsenate cathodes)
- IT Reduction, electrochemical
(of Fe^{3+} in lithium iron phosphate and arsenate cathodes)
- IT 16986-74-6
RL: PEP (Physical, engineering or chemical process); PRP (Properties); RCT
(Reactant); PROC (Process); RACT (Reactant or reagent)
(as cathode materials for rechargeable lithium
batteries)
- IT 16570-18-6
RL: PEP (Physical, engineering or chemical process); PRP (Properties); RCT
(Reactant); PROC (Process); RACT (Reactant or reagent)
(cathode materials for rechargeable lithium batteries
)
- IT 207733-44-6, Iron lithium phosphate ($\text{Fe}_2\text{Li}_5(\text{PO}_4)_3$)
RL: FMU (Formation, unclassified); PEP (Physical, engineering or chemical
process); PRP (Properties); FORM (Formation, nonpreparative); PROC
(Process)
(electrochem. formation: new cathode materials for
rechargeable lithium batteries)
- IT 207733-39-9, Iron lithium phosphate ($\text{Fe}_2\text{Li}_4(\text{PO}_4)_3$)
RL: FMU (Formation, unclassified); PEP (Physical, engineering or chemical
process); PRP (Properties); RCT (Reactant); FORM (Formation,
nonpreparative); PROC (Process); RACT (Reactant or reagent)
(electrochem. formation: new cathode materials for
rechargeable lithium batteries)
- IT 110-71-4, DME
RL: NUU (Other use, unclassified); PRP (Properties); USES (Uses)
(electrochem. insertion/extraction of lithium into/from $\text{Li}_3\text{Fe}_2(\text{XO}_4)_3$ (X = P,
As) framework structures in solution containing)
- IT 7791-03-9, Lithium perchlorate
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical
process); PRP (Properties); PROC (Process); USES (Uses)
(electrochem. intercalation of lithium by $\text{Li}_3\text{Fe}_2(\text{XO}_4)_3$ (X = P, As) in
propylene carbonate containing)
- IT 9002-84-0, PTFE
RL: NUU (Other use, unclassified); PRP (Properties); USES (Uses)
(in formation of $\text{Li}_3\text{Fe}_2(\text{XO}_4)_3$ (X = P, As) cathode for

rechargeable lithium batteries)

- IT 144-55-8, Carbonic acid monosodium salt, properties
 RL: PRP (Properties); RCT (Reactant); RACT (Reactant or reagent)
 (in formation of $\text{Na}_3\text{Fe}_2(\text{XO}_4)_3$ ($\text{X} = \text{P}, \text{As}$))
- IT 36058-25-0P 101324-14-5P
 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); PROC (Process); USES (Uses)
 (monoclinic and rhombohedral; as new cathode materials for rechargeable lithium batteries; lithium electrochem., intercalation/deintercalation by)
- IT 198782-41-1, Iron lithium phosphate ($\text{Fe}_2\text{Li}_3-5(\text{PO}_4)_3$)
 RL: FMU (Formation, unclassified); PEP (Physical, engineering or chemical process); PRP (Properties); FORM (Formation, nonpreparative); PROC (Process)
 (new cathode materials for rechargeable lithium batteries: 3-D framework structures $\text{Li}_3\text{Fe}_2(\text{XO}_4)_3$ ($\text{X} = \text{P}, \text{As}$))
- IT 207733-37-7, Iron lithium arsenate ($\text{Fe}_2\text{Li}_3-4.8(\text{AsO}_4)_3$)
 RL: FMU (Formation, unclassified); PEP (Physical, engineering or chemical process); PRP (Properties); FORM (Formation, nonpreparative); PROC (Process)
 (new cathode materials for rechargeable lithium batteries: electrochem. formation of)
- IT 207733-44-6, Iron lithium phosphate ($\text{Fe}_2\text{Li}_5(\text{PO}_4)_3$)
 RL: FMU (Formation, unclassified); PEP (Physical, engineering or chemical process); PRP (Properties); FORM (Formation, nonpreparative); PROC (Process)
 (electrochem. formation: new cathode materials for rechargeable lithium batteries)
- RN 207733-44-6 HCAPLUS
- CN Phosphoric acid, iron(2+) lithium salt (3:2:5) (9CI) (CA INDEX NAME)



●2/3 Fe(II)

●5/3 Li

- IT 36058-25-0P
 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); PROC (Process); USES (Uses)
 (monoclinic and rhombohedral; as new cathode materials for rechargeable lithium batteries; lithium electrochem., intercalation/deintercalation by)
- RN 36058-25-0 HCAPLUS
- CN Phosphoric acid, iron(3+) lithium salt (3:2:3) (9CI) (CA INDEX NAME)



● 2/3 Fe(III)

● Li

RE.CNT 25 THERE ARE 25 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L108 ANSWER 28 OF 28 HCAPLUS COPYRIGHT 2009 ACS on SIN

AN 1995:608255 HCAPLUS Full-text

DN 123:131351

OREF 123:23023a,23026a

TI Conductive epoxy-graphite composite as a solid internal
reference in a NASICON-based sodium ion-selective
electrode for flow-injection analysis

AU Bartoli, J.; Alern, Ll.; Fabry, P.; Siebert, E.

CS Grup de Sensors i Biosensors, Dept. Química, Universitat Autònoma de
Barcelona, Bellaterra, E-08193, Spain

SO Analytica Chimica Acta (1995), 308(1-3), 102-8

CODEN: ACACAM; ISSN: 0003-2670

PB Elsevier

DT Journal

LA English

AB A solid-state conductive polymer composite is proposed as a substitute for the
internal liquid reference in a Na sensor. Epoxy-graphite was used as the
composite and NASICON as a sensitive membrane. The absence of a liquid
internal solution allows the straightforward construction of these transducers
in various shapes and dimensions. This is possible because of the use of an
easily moldable plastic support. The conductivity of the epoxy-graphite
composite and the electrochem. behavior of the NASICON/conductive epoxy
interface were characterized by impedance spectroscopy. The stability and
reproducibility of the electrode potential were studied. Different comps. of
the reference system were tested. An all-solid-state, flow-through, tubular
Na sensor based on a NASICON membrane was evaluated. The construction of a
miniaturized sensor is described and its application to flow-injection anal.
is reported.

CC 79-2 (Inorganic Analytical Chemistry)

Section cross-reference(s): 72

ST epoxy graphite composite internal ref ISE; sodium selective
electrode composite internal ref; flow injection analysis sodium
selective electrode

IT Epoxy resins, uses

RL: DEV (Device component use); USES (Uses)
(conductive epoxy-graphite composite as a solid internal reference
in a NASICON-based sodium ion-selective electrode
for flow-injection anal.)

IT Electrodes

(sodium-selective, conductive epoxy-graphite composite as a
solid internal reference in a NASICON-based sodium ion-selective
electrode for flow-injection anal.)

IT 7440-23-5, Sodium, analysis

RL: ANT (Analyte); ANST (Analytical study)
(conductive epoxy-graphite composite as a solid internal reference
in a NASICON-based sodium ion-selective electrode
for flow-injection anal.)
IT 7782-42-5, Graphite, uses 58572-20-6, Sodium zirconium
phosphate silicate (Na3Zr2(PO4)(SiO4)2)
RL: DEV (Device component use); USES (Uses)
(conductive epoxy-graphite composite as a solid internal reference
in a NASICON-based sodium ion-selective electrode
for flow-injection anal.)
IT 7782-42-5, Graphite, uses
RL: DEV (Device component use); USES (Uses)
(conductive epoxy-graphite composite as a solid internal reference
in a NASICON-based sodium ion-selective electrode
for flow-injection anal.)
RN 7782-42-5 HCAPLUS
CN Graphite (CA INDEX NAME)

C

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FILE LAST UPDATED: 20 JAN 2009 <20090120/UP>

MOST RECENT UPDATE: 200905 <200905/DW>

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US National Classifications to mid September 2008.

ECLA classifications are complete to mid August 2008 and

F-Term and FI-Term classifications to the end of 2007.

No update date (UP) has been created for the reclassified

documents, but they can be identified by

specific update codes (see HELP CLA for details)<<<

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PLEASE VISIT:

http://www.stn-international.com/stn_guide.html

FOR DETAILS OF THE PATENTS COVERED IN CURRENT UPDATES, SEE

<http://scientific.thomsonreuters.com/support/patents/coverage/latestupdates/>

EXPLORE DERWENT WORLD PATENTS INDEX IN STN ANAVIST, VERSION 2.0:

http://www.stn-international.com/DWPIAnaVist2_0608.html

>>> HELP for European Patent Classifications see HELP ECLA, HELP ICO <<<

'BI ABEX' IS DEFAULT SEARCH FIELD FOR 'WPIX' FILE

=> d l134 bib ab tech abex tot

L134 ANSWER 1 OF 17 WPIX COPYRIGHT 2009

THOMSON REUTERS on STN

AN 2006-587913 [61] WPIX Full-text

CR 2000-089091

DNC C2006-182048 [61]

DNN N2006-473479 [61]

TI Cross linkable polymer, useful in e.g. a material with ionic conduction and electrochemical cells, prepared by starting with anion polymerization followed by a cation crosslinking

DC A14; A25; A85; L03; X16

IN ARMAND M; GAUTHIER M; HARVEY P; MICHOT C; VALLE A

PA (HYDR-N) HYDRO-QUEBEC

CYC 4

FIA EP 1693390 Al 20060823 (200661)* FR 29[0]

ADT EP 1693390 Al Div Ex EP 1999-112241 19990625; EP 1693390 Al

EP 2006-4071 19990625

FDT EP 1693390 Al Div ex EP 967233 A

PRAI CA 1998-2243103 19980710

CA 1998-2242017 19980625

AB EP 1693390 Al UPAB: 20060922

NOVELTY - Cross linkable polymer (I), prepared by starting with anion polymerization followed by a cation crosslinking.
DETAILED DESCRIPTION - Cross linkable polymer (I), prepared by starting with anion polymerization followed by a cation crosslinking, of formula (A)nQ(Y1)p. Q = a bond, CO, SO₂ or an organic radical with a valence (n+p) non-reactive with the agents initiating anion or cation polymerization e.g. 1-30C, alkyl, alkylaryl or arylalkyl (optionally substituted by oxa or aza); A = a radical reactive in anion polymerization; Y1 = a radical reactive in cation polymerization and non-reactive with an agent initiating anion polymerization; n = 1-3; and p = 1-6.

INDEPENDENT CLAIMS are included for: (1) a polymer (II) prepared by anionic priming of a comonomer (I) in which only (A) are built-in in polymer; (2) material (IV) with ionic conduction comprises (II) and at least a salt of formula (Mn+Xn-);

(3) an electrochemical cell (V), where the electrolyte is made up at least partly by (IV);

(4) a primary or secondary generating or high capacity electric power storage system for (V) comprising a negative electrode and a positive electrode, which comprises at least partly (IV); and (5) a modulation system (VI) of light comprising two supports, with of which at least a transparency, covered with a base conductor containing oxide of doped indium, tin or oxide and a layer of an electrochromed material and a counter electrode, where the electrolyte is (IV). Mn+ = (in)organic or organometallic cation with n charges; and X = a monovalent anion, where two or more X are able to be whole by covalent chain or able to belong to the polymer chain.

USE - (I) is useful in a material with ionic conduction, electrochemical cells, a primary or secondary generating or high capacity electric power storage system and in a modulation system of light (claimed).

TECH

INORGANIC CHEMISTRY - Preferred Components: In (V) the ions taking part in the reactions of electrodes are the ions lithium. The negative electrode in (V) is lithium metal, its alloys, optionally in the form of nanometric dispersion in lithium oxide, double nitrides of lithium and a transition metal, oxides with base potential of formulae (Li1+yTi2-x/404), where x greater than or equal to 0 and y less than or equal to 1, MoO₂, WO₂, carbon and carbonaceous products resulting from the organic matter pyrolysis or lithium-aluminum or lithium-silicon alloys. The positive electrode in (V) is another material of electrode comprising vanadium oxides of formula (Li1yVOx) (where 2x-5 less than or equal to y less than or equal to 2x-3; 2.15 less than or equal to x less than or equal to 2.5), Li1yNi-x-zCo1xAlzO2 (where 0 less than

L134 ANSWER 2 OF 17 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
 AN 2004-108446 [11] WPIX Full-text
 DNC C2004-044285 [11]
 DNN N2004-086200 [11]
 TI Preparation of lithium-containing olivine or NASICON precursors compounds, involves preparing specific water-based solution, polymerizing monomer compounds, heating in preset atmosphere, and decomposing polymer to carbon
 DC A85; L03; P42; X16
 IN AUDEMER A; GWIZDALA S; MASQUELIER C; MORCRETTE M; WURM C; ALBANE A; CALIN W; CHRISTIAN M; MATHIEU M; SYLVAIN G
 PA (CNRS-C) CENT NAT RECH SCI; (CNRS-C) CNRS CENT NAT RECH SCI; (UMIC-N) UMICORE; (AUDE-I) AUDEMER A; (GWIZ-I) GWIZDALA S; (MASQ-I) MASQUELIER C; (MORC-I) MORCRETTE M; (WURM-I) WURM C
 CYC 103
 PIA WO 2004001881 A2 20031231 (200411)* EN 18[5]
 AU 2003250847 A1 20040106 (200447) EN
 EP 1518284 A2 20050330 (200522) EN
 AU 2003250847 A8 20040106 (200559) EN
 JP 2005530676 W 20051013 (200568) JA 16
 CN 1663064 A 20050831 (200607) ZH
 US 20060035150 A1 20060216 (200614) EN
 KR 2005094346 A 20050927 (200648) KO
 CN 100379062 C 20080402 (200845) ZH
 ADT WO 2004001881 A2 WO 2003-EP6628 20030619; US 20060035150 A1 Provisional US 2002-392978P 20020702; AU 2003250847 A1 AU 2003-250847 20030619; AU 2003250847 A8 AU 2003-250847 20030619; CN 1663064 A CN 2003-814563 20030619; EP 1518284 A2 EP 2003-760688 20030619; EP 1518284 A2 WO 2003-EP6628 20030619; JP 2005530676 W WO 2003-EP6628 20030619; US 20060035150 A1 WO 2003-EP6628 20030619; KR 2005094346 A WO 2003-EP6628 20030619; JP 2005530676 W JP 2004-530900 20030619; KR 2005094346 A KR 2004-720756 20041220; US 20060035150 A1 US 2005-518560 20050831; CN 100379062 C CN 2003-814563 20030619
 FDT AU 2003250847 A1 Based on WO 2004001881 A; EP 1518284 A2 Based on WO 2004001881 A; AU 2003250847 A8 Based on WO 2004001881 A; JP 2005530676 W Based on WO 2004001881 A; KR 2005094346 A Based on WO 2004001881 A
 PRAI US 2002-392978P 20020702
 EP 2002-291562 20030621
 AB WO 2004001881 A2 UPAB: 20060121
 NOVELTY - An aqueous solution comprising 1 or more lithium-containing olivine (LO) or NASICON precursors compounds (NPC), and 1 or more carbon bearing monomer compounds, as solutes is prepared. The LO and NPC are precipitated, and monomer compounds are polymerized in a single step. The obtained precipitate is heated in neutral or reducing environment, polymer is decomposed to carbon, and LO or NASICON crystalline phase is formed.
 DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:
 (1) the production of carbon-coated lithium-iron-phosphate (LiFePO₄);
 (2) a carbon-coated LiFePO₄ powder; (3) an electrode mix; and
 (4) a battery containing the electrode mix.
 USE - Used for preparing carbon coated lithium-containing olivine or NASICON powders for an electrode mix used for a battery (both claimed).
 ADVANTAGE - The battery using the carbon coated lithium-containing olivine or NASICON powders, has good capacity retention, and fast charging and discharging rates. The carbon coated lithium-containing olivine or NASICON powders has high current performance.
 TECH INORGANIC CHEMISTRY - Preferred Composition: The crystalline phase is given by formula: Li_uMv(XO₄)_w, preferably LiFePO₄, where u is

1-3, v is 1 or 2, w is 1 or 3, M is Ti₄VbCrcMndFeeCofNigSchNbI, where Ti is titanium, V is vanadium, Cr is chromium, Mn is manganese, Fe is ferrite, Co is cobalt, Ni is nickel, Sc is scandium, Nb is niobium, a+b+c+d+e+f+g+h+i = 1, and X is Px-zSx, and 0 at most x at most 1, where P is phosphorous and S is sulfur.

Preferred Process: The precipitation of lithium-containing olivine or NASICON compounds and polymerization of the monomers is performed by evaporating water from the water-based solution. POLYMERS - Preferred Compounds: The carbon-bearing monomer compounds are polyhydric alcohol which is ethylene glycol and polycarboxylic acid which is citric acid.

L134 ANSWER 3 OF 17 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
 AN 2004-010104 [01] WPIX Full-text
 CR 2005-570753
 DNC C2004-002838 [01]
 DNN N2004-007266 [01]
 TI Lithium battery comprises first electrode containing active material, second electrode, and electrolyte containing mixture of cyclic ester and carbonate
 DC L03; X16
 IN HUANG H; PUGH J; PUGH J K; SAIDI M Y
 PA (HUAN-I) HUANG H; (PUGH-I) PUGH J; (SAID-I) SAIDI M Y; (VALE-N) VALENCE TECHNOLOGY INC
 CYC 101
 PIA US 20030190527 A1 20031009 (200401)* EN 24[0]
 WO 2003085757 A1 20031016 (200401) EN
 AU 2003224801 A1 20031020 (200436) EN
 EP 1490917 A1 20041229 (200502) EN
 KR 2004111470 A 20041231 (200528) KO
 JP 2005522009 W 20050721 (200549) JA 42
 CN 1650450 A 20050803 (200578) ZH
 ADT US 20030190527 A1 US 2002-116276 20020403; AU 2003224801 A1 AU 2003-224801 20030327; CN 1650450 A CN 2003-810033 20030327; EP 1490917 A1 EP 2003-721492 20030327; JP 2005522009 W JP 2003-582838 20030327; WO 2003085757 A1 WO 2003-US9634 20030327; EP 1490917 A1 WO 2003-US9634 20030327; JP 2005522009 W WO 2003-US9634 20030327; KR 2004111470 A KR 2004-715673 20041001
 FDT AU 2003224801 A1 Based on WO 2003085757 A; EP 1490917 A1 Based on WO 2003085757 A; JP 2005522009 W Based on WO 2003085757 A
 PRAI US 2002-116276 20020403
 AB US 20030190527 A1 UPAB: 20060203
 NOVELTY - A lithium battery comprises first electrode containing active material, second electrode, and electrolyte containing mixture of cyclic ester and carbonate. The carbonate is alkyl and/or alkylene carbonates. The second electrode is a counter electrode to the first electrode.
 DETAILED DESCRIPTION - A lithium battery comprises first electrode containing active material, second electrode, and electrolyte containing mixture of cyclic ester and carbonate. The carbonate is alkyl and/or alkylene carbonates. The second electrode is a counter electrode to the first electrode. The active material comprises a compound of formula (I).
 AaMb(XY₄)cZd (I)
 A = Li, Na, and/or K;
 a = more than 0-at most 9;
 M = metal(s) capable of oxidation to higher valence state; b = at least 1-at most 3;
 XY₄ = X'O₄-xY'_x, X'O₄-y Y'2y and/or X''S₄; X' = P, As, Sb, Si, Ge, V and/or S;
 X'' = P, As, Sb, Si, Ge and/or V; Y' = halo, S and/or N;
 c = more than 0-at most 3;
 x = at least 0-at most 3; and y = more than 0-at most 2.

M, XY₄, Z, a, b, c, d, x, and y are selected to maintain electroneutrality of the compound.

USE - Power source of the device.

ADVANTAGE - Provides increased capacity, improved cycling capability, improved reversibility and reduced costs.

TECH

ELECTRICAL POWER AND ENERGY - Preferred Components: The active material has an olivine structure or NA super ionic conductor (NASICON) structure. The carbonate is alkylene carbonate with ring size of 5-8 atoms and is (substituted) with lower alkyl on carbon atom(s) or 1-6C alkyl carbonate (substituted) with 1-4C alkyl on carbon atom(s). The carbonate comprises alkylene carbonate. The weight ratio of cyclic ester to alkylene carbonate is 1:1-5:1, preferably 3:1. The carbonate is ethylene carbonate. The cyclic ester is gamma-butyrolactone. The electrode active material preferably has formula (II)-(XIII)

$\text{Li}_a\text{Co}_b\text{Fe}_c\text{M}_1\text{M}_2\text{M}_3\text{XY}_4$ (II)

$\text{LiM}(\text{PO}_4-x\text{Y}'x)$ (III)

$\text{LiFe}_0.9\text{Mg}_0.1\text{PO}_4$ (IV)

$\text{LiFe}_0.8\text{Mg}_0.2\text{PO}_4$ (V)

$\text{Li}_1.025\text{Co}_0.85\text{Fe}_0.05\text{Al}_0.025\text{Mg}_0.05\text{PO}_4$ (VI)

$\text{Li}_1.025\text{Co}_0.75(\text{Fe}_0.4\text{Mn}_0.6)0.2\text{Al}_0.025\text{Mg}_0.05\text{PO}_4$ (VII)

$\text{Li}_1.025\text{Co}_0.7(\text{Fe}_0.4\text{Mn}_0.6)0.2\text{Al}_0.025\text{Mg}_0.05\text{PO}_4$ (VIII)

$\text{LiCo}_0.8\text{Fe}_0.1\text{Al}_0.025\text{Ca}_0.05\text{PO}_3.975\text{F}_0.025$ (IX)

$\text{LiCo}_0.8\text{Fe}_0.1\text{Al}_0.025\text{Mg}_0.05\text{PO}_3.975\text{F}_0.025$ (X)

$\text{LiCo}_0.8\text{Fe}_0.1\text{Ti}_0.25\text{Al}_0.025\text{PO}_4$ (XI) $\text{LiCu}_0.825\text{Fe}_0.1\text{Ti}_0.025\text{Mg}_0.025\text{PO}_4$ (XII)

$\text{LiCu}_0.85\text{Fe}_0.075\text{Ti}_0.025\text{Mg}_0.025\text{PO}_4$ (XIII)

M₁ = transition metal(s);

c, f, g, i = more than 0;

g = more than 0.8, preferably 0.9

j = at least 0;

M₂ = +2 oxidation state non-transition metal, preferably V, Cr, Mn, Fe, Co and/or Ni;

M₃ = +3 oxidation state non-transition metal(s);

e+f+g+h+i = less than 2, preferably at least 0.9 at most 1;

e = at least 0.8;

f = at least 0.01-at most 0.5, preferably at least 0.05-at most 0.2;

x = at least 0-at most 0.5;

h+i = more than 0, preferably 0.02-at most 0.5, preferably 0.1;

h = more than 0-at most 0.2, preferably at least 0.01-at most 0.1;

i = at least 0.01-at most 0.2, preferably at least 0.01-at most 0.1;

X' = P, As, Sb, Si, Ge and/or V;

Y' = halo, S and/or N.

The alkylene carbonate is ethylene carbonate (preferred), 1,3-propylene carbonate, 1,4-butylen carbonate, 1,5-pentyl carbonate, 1,2-propylene carbonate, 2,3-butylen carbonate and/or 1,2-butylen carbonate. The alkyl carbonate is diethyl carbonate, ethyl methyl carbonate and/or di methyl carbonate. The cyclic ester is (substituted) beta-propiolactone, gamma-butyrolactone, delta-valerolactone, and/or epsilon-caprolactone. The electrolyte salt is lithium salt. The lithium salt is lithium arsenide heptafluoride, lithium phosphorus hexafluoride (LiPF₆), lithium chlorate, lithium-boron tetraphenyl, lithium aluminum tetrachloride, lithium bromide, lithium boron tetrafluoride (preferred), lithium sulfate carbon trifluoride, and/or lithium nitrodiethyl sulfonic heptafluoride. The cyclic ester is preset at at least 60% of the electrolyte. The electrolyte comprises solvent i.e. alkylene carbonates and/or cyclic ester. The first electrode is cathode. The second electrode is an insertion anode. The second electrode comprises metal oxides, metal chalcogenide and/or carbon graphite.

ABEX DEFINITIONS - Preferred Definitions: - a = at least 0.1-at most 2; - c =

1; - d = more than 0.1-at most 4; - A = Li; - M = M'-mM''m; - M' = transition metal from group 4-11 of the periodic table e.g. Mn, V, Cr and/or Ti, preferably Fe and/or Co; - M'' = Group 2, 3, or 12-16 of the periodic table, preferably Mg, Ca, An, Sr, Pb, Cd, Sn, Ba, Be and/or Al; - m = more than 0-less than 1; - X' = PX'' = P, Si or mixture of S and P; - Z = F; - x = more than 0-3; and - y = more than 0-less than 4.

EXAMPLE - Lithium carbonate (3.8g), cobalt oxide (7.2g), aluminum hydroxide (0.195 g), magnesium hydroxide (0.29g), ammonium hydro phosphate (13.2g) and elemental carbon (2.4g) were combined in a ball mill. The particle mixture was pelletized and heated for 4-20 hours at 750 degreesC in an oven in a n argon atmosphere. The sample was removed from the oven and cooled. An x-ray diffraction pattern shows that the material has an olefin type crystal structure. An electrode was made with 80% of the active material, 10% super P-conductive carbon and 10% polyvinylidene difluoride. A cell with the electrode as cathode and lithium metal as anode was constructed with an electrolyte containing 1M LiPF6 in 2:1 mixture of ethylene carbonate:dimethyl carbonate. The active material exhibits reversible capacity over 140 mAhg-1.

L134 ANSWER 4 OF 17 WPIX COPYRIGHT 2009

THOMSON REUTERS on STN

AN 2003-875127 [81] WPIX Full-text

DNC C2003-247085 [81]

DNN N2003-698763 [81]

TI Electrode for non-aqueous lithium battery, for e.g. portable telecommunication equipment, comprises lithium-metal oxide compound having layered structure

DC L03; X16

IN JOHNSON C S; KAHAIAN A J; KIM J; THACKERAY M M; VAUGHNEY J T

PA (UYCH-N) UNIV CHICAGO; (UCHI-N) UCHICAGO ARGONNE LLC

CYC 1

PIA US 20030180616 A1 20030925 (200381)* EN 28[16]

US 7358009 B2 20080415 (200828) EN

ADT US 20030180616 A1 Provisional US 2002-357393P 20020215; US 20030180616 A1 US 2003-365286 20030212

PRAI US 2003-365286 20030212

US 2002-357393P 20020215

AB US 20030180616 A1 UPAB: 20050531

NOVELTY - An electrode for a non-aqueous lithium electrochemical cell comprises a lithium-metal oxide compound having a layered structure in which the metal has at least 2 positively charged metal ions with an atomic number less than 51.

DETAILED DESCRIPTION - An electrode for a non-aqueous lithium electrochemical cell comprises a lithium-metal oxide compound having a layered Li2MO2 structure in which the metal has at least 2 positively charged metal ions with an atomic number less than 51. INDEPENDENT CLAIMS are also included for: (a) a compound comprising a lithium-metal oxide having a layered Li2MO2 structure; (b) a method for synthesizing the electrode by the electrochemical insertion of lithium into a lithium metal oxide electrode precursor containing the metal cations; or by the chemical reaction of a lithiating agent with a lithium metal oxide electrode precursor containing the metal cations; and (c) a non-aqueous lithium battery comprising electrically connected electrochemical cells, each comprising a negative electrode (12), electrolyte (14) and positive electrode (16).

USE - As negative or positive electrode for a non-aqueous lithium electrochemical cell of a non-aqueous lithium battery (claimed) for e.g. portable telecommunication equipment and computers, medical devices and electric or hybrid electric vehicles.

ADVANTAGE - The high content of lithium in Li2MO2 electrodes can be used to offset the loss in capacity that is usually encountered in lithium ion cells.

The Li2MO2 compounds have a layered-type structure and can be used as positive electrode for lithium electrochemical cells or as a precursor for the in-situ electrochemical fabrication of LiMO2 electrodes. The Li2MO2 compounds of the invention may have additional functions in lithium cells e.g. as end-of-discharge indicators or as negative electrodes for lithium cells.

DESCRIPTION OF DRAWINGS - The figure shows an electrochemical cell. Negative electrode (12)

Electrolyte (14)

Positive electrode (16)

Insulating housing (18)

TECH

INORGANIC CHEMISTRY - Preferred Materials: The metal (M) and lithium (Li) ions are partially disordered over the M and Li crystallographic sites of the Li2MO2 structure. The lithium ions are at least partially ion exchanged with hydrogen ions. The metal is from the first row of transition metal elements. It is preferably titanium (Ti), vanadium (V), chromium (Cr), iron (Fe), manganese (Mn), cobalt (Co), nickel (Ni) or copper (Cu) ions. The metal is partially substituted by monovalent or multivalent non-transition metal ions with an atomic number less than 51. M is partially substituted by Li, magnesium (Mg), aluminum (Al) or tin (Sn) ions. Li2MO2 is derived from xLiMO2.(1-x)Li2MO3 solid solution or composite structure in which M is titanium, manganese, zirconium, ruthenium or tin ion. The secondary positive electrode is lithium cobalt oxide (LiCoO2), lithium nickel oxide (LiNiO2), lithium manganese oxide (LiMnO2), lithium manganese nickel oxide (LiMn0.5Ni0.5O2), lithium manganese nickel cobalt oxide (LiMn1/3Ni1/3Co1/3O2), lithium nickel cobalt aluminum oxide (LiNi0.8Co0.15Al0.05O2), lithium nickel cobalt titanium magnesium oxide (LiNi0.75Co0.15Ti0.05O2), lithium manganese oxide (Li1+xMn2-xO4 where x is greater than 0 and less than 0.33), lithium iron phosphorus oxide (LiFePO4), lithium manganese phosphorus oxide (LiMnPO4), or lithium cobalt phosphorus oxide (LiCoPO4).

ELECTRONICS - Preferred Components: The Li2MO2 electrode is mixed or coated with an electronic conductor. Li2MO2 is the positive electrode of an electrochemical cell. It may be the precursor for a positive LiMO2 electrode of an electrochemical cell. Li2MO2 may be the negative electrode of an electrochemical cell or the end-of-discharge indicator for an electrochemical cell. Li2MO2 is blended or mixed with secondary positive electrodes for a lithium electrochemical cell. The secondary positive electrode has a layered, spinel or olivine-type structure.

L134 ANSWER 5 OF 17 WPIX COPYRIGHT 2009

THOMSON REUTERS on STN

AN 2003-834996 [78] WPIX [Full-text](#)

DNC C2003-234952 [78]

DNN N2003-667441 [78]

TI Rechargeable lithium cells and batteries with active anode and cathode intercalation materials use electrolyte that is thermodynamically stable towards reduction at lithium-intercalated anode during operation

DC E11; E34; L03; X16

IN PAULSEN J M

PA (PAUL-I) PAULSEN J M

CYC 1

PIA DE 10215305 A1 20031023 (200378)* DE 16[0]

ADT DE 10215305 A1 DE 2002-10215305 20020408

PRAI DE 2002-10215305 20020408

AB DE 10215305 A1 UPAB: 20050531

NOVELTY - In rechargeable lithium cells with improved cycle stability and good high current properties, consisting of an anode film with (A) an active anode intercalation material, a cathode film with (B) an active cathode intercalation material and an electrolyte, consisting of (C) electrolyte salt dissolved in (D) an electrolyte solvent, the electrolyte is thermodynamically stable towards reduction at the Li-intercalated anode during operation.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for numerous versions of Li cells of this type with specified combinations of components. USE - The cells are used in lithium batteries with 1, 2, 3 or more cells and large, rechargeable batteries with at least 6 Li cells and 5-100 bipolar plates connected in series (all claimed).

ADVANTAGE - Conventional lithium (Li) ion cells with carbon anodes have limited cycle stability (up to 1000 cycles at room temperature) caused by fading (loss of capacity) and increased impedance. The rate of fading increases at higher temperatures (e.g. 55 degrees C). Fading is caused by (1) loss of Li at the anode by electrolyte reduction, (2) build-up of impedance films at the cathode and (3) destruction of active electrode material, especially at the cathode. Problems (2) and (3) are prevented or reduced by preventing or reducing (1). Other problems are (4) gas evolution, especially during first cycle, (5) reduced safety and (6) increased self-discharge. All these problems are solved or greatly reduced by using 1.5 V material for the anode, water-stable electrolyte salt, acyclic molecule for electrolyte solvent and 4 V material for the active cathode material.

TECH

ELECTRICAL POWER AND ENERGY - Preferred Cells: (claimed) The specified combinations of components are as follows:

(a, b): potential versus Li/Li⁺ is over 1 V for Li-intercalated anode and over 3.5 V for Li-deintercalated cathode, electrolyte salt (C) is stable in water and electrolyte solvent (D) is (1) free from ethylene carbonate (EC) or (2) consists of acyclic molecules;
 (c): (A) is a Li-M oxide with spinel crystal structure, in which not less than 90% of M is transition metal and not less than 75% of M is titanium (Ti), (B) is a Li-M oxide with spinel crystal structure, in which not less than 90% of M is transition metal and not less than 75% of M is manganese (Mn), Li -transition metal phosphate with olivine structure and/or Li-M oxide with foliated structure (R-3 m), in which not less than 90% of M is transition metal, (D) contains not less than 80% dimethyl carbonate (DMC) and/or acetonitrile (AN) and (C) is Li-BETI (LiN(C2F5SO2)2), LiBF4, LiClO4 and/or Li-PAF (LiPF3(C2F5)3);
 (d, e, f): as (c), in which (A) has BET surface area of (d) 1-20, (e) 2-15, (f) 2-10 m²/g, (B) is Li-M oxide with spinel structure, in which not less than 90% of M is Mn and BET surface area is (d) 0.5-15, (e) 1-7, (f) 1-6 m²/g, (C) is (d, e, f) stable in water and (f) consists of Li-BETI, LiBF4 and/or Li-PAF and (D) consists of (d, e) acyclic molecules, with (d) not less than 50, (e) not less than 80% AN, (f) AN;
 (g, h, i): (A) consists of Li-M oxide with spinel structure, in which not less than 90% of M is transition metal and not less than 75% is Ti, with BET surface area 1-10 m²/g, (B) has a BET surface area of 0.5-6 m²/g and consists of Li-M oxide with spinel structure, in which not less than 90% of M is transition metal and not less than 75% is Mn, and/or Li-M oxide with foliated structure (R-3 m), in which not less than 90% of M is transition metal, (D) consists of acyclic molecules and is (g) not less than 50, (h) not less than 80 DMC, (i) DMC, and (C) is (g, h) stable in water, (i) consists of Li-BETI, LiBF4, LiClO4 and/or Li-PAF;
 (j, k, l): (A) consists of Li-M oxide with spinel structure, in which not less than 90% of M is transition metal and not less than 75% is Ti, with BET surface area (j, k) 0.5-10, (l) 0.5-6 m²/g, (B) is Li -M phosphate with olivine structure, in which not less than 90% of M is transition metal, (D) consists of (j, k) acyclic molecules with

(k) % 80% DMC and/or AN, (l) DMC and/or AN and (C) is stable in water and (k, l) consists of Li-BETI, LiBF₄, LiClO₄ and/or Li-PAF.

Preferred Cells: In cells (d, e, f) and (g, h, i), the cathode film contains (d, e, f) 10-25, (g, h, i) 15-35 mg/cm² active cathode material, the anode film contains (d, e, f) 7-20, (g, h, i) 10-25 mg/cm² active anode material and the volume packing density of both the active cathode and anode materials is (d, e, f) 40-60, (g, h, i) 50-75%. In all cases, the ratio between cathode capacity and anode capacity is 0.7-0.95. Preferred Batteries: (claimed) The batteries are: 1. rechargeable Li batteries with cell(s) of the cited type; 2. Li batteries containing cell(s) of type (d, e, f) or (g, h, i) which, without the voltage varying by over 20% from the open-circuit voltage (OCV), can be (d, e, f) recharged in the discharged state for over 1 minute at 30C rate and discharged in the charged state for not less than 30 seconds at 60C rate or (g, h, i) recharged for over 5 minutes at 6C rate and discharged for at least 3 minutes at 10C rate; 3. rechargeable batteries with not less than 2 Li cells, which have not less than 1 bipolar plate consisting of an anode film and a cathode film covering equal areas on opposite sides of an aluminum plate or foil substrate. The rechargeable batteries have not less than 3 Li cells with not less than 2 bipolar plates, separated from an electrolyte, connected in series, especially not less than 6 Li cells with 5-100 bipolar plates, in which the area of the cathode film on the bipolar plates is 100-4000 cm².

ABEX EXAMPLE - Lithium (Li) cells had an anode film with active anode intercalation material of Li-titanium spinel Li₄Ti₅O₁₂ with a BET surface area of 2.6 m²/g; cathode film with an active cathode intercalation material of Li-chromium-manganese oxide Li(Lix(Cr_{0.05}Mn_{0.95})_{1-x})O₄ (x about 0.03) with a BET surface area of 3 m²/g; and an electrolyte of (A) 1 M Li-BETI (Li(C₂F₅SO₂)₂) in dimethyl carbonate (DMC) or, as control, (B) 1M LiPF₆ in propylene carbonate (PC), (C) 1 M Li-BETI in PC. The cathode film had a loading of 20 mg/cm² and the cathode/anode capacity ratio was 0.9. To increase the reduction rate, the batteries were cycled at 55 degrees C, each cycle lasting about 4 hours. The capacity at cycle 50/100/200 was (A) 98/97/97, (B) 97/92/85, (C) 96/91/83 mAh/g active cathode material; and the fading rate per 100 cycles was (A) 1, (B) 9, (C) 9 %.

L134 ANSWER 6 OF 17 WPIX COPYRIGHT 2009

THOMSON REUTERS on STN

AN 2003-662111 [62] WPIX Full-text

CR 2001-581595; 2002-453607

DNC C2003-179962 [62]

DNN N2003-528379 [62]

TI Lithium-ion battery includes first electrode having active material of lithium mixed-metal phosphates, second electrode which is counter-electrode to first electrode, and electrolyte between electrodes

DC L03; X16

IN BARKER J; SAIDI M Y

PA (BARK-I) BARKER J; (SAID-I) SAIDI M Y

CYC 1

PIA US 20030129492 A1 20030710 (200362)* EN 40[23]

ADT US 20030129492 A1 08 2009-484759 20000118

PRAI US 2009-484759 20000118

AB US 20030129492 A1 UPAB: 20060120

NOVELTY - A lithium-ion battery has a first electrode having an active material of lithium mixed-metal phosphates; a second electrode which is a counter-electrode to the first electrode; and an electrolyte between the electrodes (12, 14).

DETAILED DESCRIPTION - A lithium (Li)-ion battery comprises a first electrode having an active material which is an *olivine* compound of nominal formula $\text{LiMI}_1\text{-yMyPO}_4$; a second electrode which is a counter-electrode to the first electrode; and an electrolyte between the electrodes. MI = transition metal(s) from Groups 4-11 (preferably V, Cr, Mn, Fe, Co, and/or Cu); MII = metallic element(s) which is Groups 2, 12, and 14 (preferably Mg, Ca, Ba, and/or Zn).

y is greater than 0 but less than 1. Each MI and MII has a +2 valence state. INDEPENDENT CLAIMS are also included for: (a) a single phase compound of nominal formula Li-vanadium pentoxide and having an orthorhombic crystal structure with $a = 9.7\pm 0.2$ Angstrom, 3.6 ± 0.2 Angstrom and $c = 10.6\pm 0.2$ Angstrom; (b) a method for preparing a single phase compound comprising reacting vanadium pentoxide and lithium compound in the presence of carbon at an elevated temperature to form the single phase compound; and (c) an electrode comprising a binder, an electrically conductive carbonaceous material and an active material which is a single phase compound specified above.

USE - As Li-ion battery.

ADVANTAGE - Provides a Li-containing electrode material having acceptable capacity without significant capacity loss when used in a cell. DESCRIPTION OF DRAWINGS - The figure shows a diagrammatic representation of a laminated Li-ion battery cell structure. Electrodes (12, 14)

L134 ANSWER 7 OF 17 WPIX COPYRIGHT 2009 THOMSON REUTERS on SIN
 AN 2003-542031 [51] WPIX Full-text
 DNC C2003-147166 [51]
 DNN N2003-429876 [51]
 TI Transition metal polyanion compound for electrode used in storage battery cells, includes metal-doped composition
 DC L03; X16
 IN ANDERSSON A M; BLOKING J T; CHIANG Y; CHIANG Y M; CHUNG S; CHUNG S Y;
 ANDERSON A M
 PA (MASI-C) MASSACHUSETTS INST TECHNOLOGY
 CYC 99
 PIA WO 2003056646 A1 20030710 (200351)* EN 122[29]
 US 20040005265 A1 20040108 (200404) EN
 AU 2002364020 A1 20030715 (200421) EN
 EP 1456895 A1 20040915 (200460) EN
 KR 2004073505 A 20040819 (200501) KO
 JP 2005514304 W 20050519 (200538) JA 72
 CN 1615554 A 20050511 (200558) ZH
 IN 2004KN00891 P2 20060519 (200659) EN
 AU 2007202605 A1 20070628 (200808)# EN
 US 7338734 B2 20080304 (200819) EN
 ADT WO 2003056646 A1 WO 2002-US41471 20021223; US 20040005265 A1 Provisional
 US 2001-343960P 20011221; US 20040005265 A1 Provisional US
 2002-388721P 20020614; US 20040005265 A1 Provisional US 2002-412656P
 20020920; AU 2002364020 A1 AU 2002-364020 20021223; AU 2007202605 A1 Div
 Ex AU 2002-364020 20021223; CN 1615554 A CN 2002-827276 20021223; EP
 1456895 A1 EP 2002-798597 20021223; US 20040005265 A1 US 2002-329046
 20021223; EP 1456895 A1 WO 2002-US41471 20021223; JP 2005514304 W WO
 2002-US41471 20021223; IN 2004KN00891 P2 WO 2002-US41471 20021223; JP
 2005514304 W JP 2003-557056 20021223; KR 2004073505 A KR 2004-709809
 20040621; IN 2004KN00891 P2 IN 2004-KN891 20040625; AU 2007202605 A1 AU
 2007-202605 20070607; US 7338734 B2 Provisional US 2001-343960P
 20011221; US 7338734 B2 Provisional US 2002-388721P 20020614
 ; US 7338734 B2 Provisional US 2002-412656P 20020920; US 7338734 B2 US
 2002-329046 20021223
 FDT AU 2002364020 A1 Based on WO 2003056646 A; EP 1456895 A1 Based on WO

2003056646 A; JP 2005514304 W Based on WO 2003056646 A
 PRAI US 2002-412656P 20020920
 US 2001-343968P 20011221
 US 2002-388721P 20020614

US 2002-329046 20021223
 AU 2007-202605 20070607

AB WO 2003056646 A1 UPAB: 20060119

NOVELTY - A transition metal polyanion compound comprises a metal-doped composition.

DETAILED DESCRIPTION - A transition metal polyanion compound comprises a composition $Ax(M^{1-l-a}Ma)y(XD4)z$, $Ax(M^{1-l-a}Ma)y(DXD4)z$, or $Ax(M^{1-l-a}Ma)y(X2D7)z$; or $(Al-aMa)xM'y(XD4)z$, $(Al-aMa)xM'y(DXD4)z$, or $(Al-aMa)xM'y(X2D7)z$, having a conductivity at 27 degreesC of at least 10 to the power -8 S/cm or at least 15 m squared/g. A = alkali metal and/or H; M' = a first-row transition metal; X = P, S, As, B, Al, Si, V, Mo, and/or W; M = a Group IIA, IIIA, IVA, VA, VIA, VIIA, VIIIA, IB, IIB, IIIB, IVB, VB, or VIB metal;

D = O, N, C, or halo;

a = greater than 0.0001 to 0.1; x = at least 0;

y, z = greater than 0 and have values so that x, plus y(1-a) times formal valence(s) of M', plus ya times formal valence(s) of M, is equal to z times a formal valence of the XD4, X2D7, or DXD4 group; so that (1-a)x plus quantity ax times the formal valence(s) of M plus y times the formal valence(s) of M' is equal to z times the formal valence of XD4, X2D7 or DXD4; or so that (b-a)x plus the quantity ax times the formal valence(s) of M plus y times the formal valence(s) of M' is equal to z times the formal valence of XD4, X2D7 or DXD4 group, crystallizing in an ordered or partially disordered structure of olivine (AxMXO4), NASICON (Ax(M', M)2(XO4)3), VOP04, LiFe(P2O7), or Fe4(P2O7)3 structure-types, and additionally having a molar concentration of the metals (M'+ M) relative to the concentration of the elements X that exceeds the ideal stoichiometric ratio y/z of the prototype compounds by at least 0.0001.

INDEPENDENT CLAIMS are also included for the following: (a) a method of forming the inventive compound comprising: mixing an alkali metal or hydrogen salt, a first-row transition metal salt, a salt of at least one phosphorus, sulfur, arsenic, silicon, aluminum, boron, vanadium, molybdenum and tungsten, and a salt of any of a Group IIA, IIIA, IVA, VA, VIA, VIIA, VIIIA, IB, IIB, IIIB, IVB, VB, and VIB metal; milling the mixture; and heat treating the mixture at 300-900 degreesC under a gaseous atmosphere with an oxygen partial pressure of less than 10 to the power -4 or less than 10 to the power -6 atm;

(b) an electrode comprising: the inventive compound and having a material energy density of greater than 350 Wh/kg while charging or discharging at at least 30 mA/g storage compound; greater than 280 Wh/kg while charging or discharging at at least 150 mA/g storage compound; greater than 270 Wh/kg while charging or discharging at at least 300 mA/g storage compound; greater than 250 Wh/kg while charging or discharging at at least 750 mA/g storage compound; greater than 180 Wh/kg charging or discharging at at least 1.5 A/g storage compound; greater than 40 Wh/kg while charging or discharging at at least 3 A/g storage compound; or greater than 10 Wh/kg while charging or discharging at at least 4.5 A/g storage compound; and

(c) a storage battery cell comprising a positive electrode, a negative electrode, and a separator positioned between the electrodes, where at least one of the electrodes comprises the inventive compound.

USE - For an electrode used in storage battery cells.

ADVANTAGE - The invention has high lithium-insertion potential, high theoretical capacity, low cost, and ease of synthesis; and is stable when used with common organic electrolyte system. It also exhibits increased electronic conductivity at and near room temperature, improves electrochemical storage including charge storage capacity, improves energy density and power density when used in an electrochemical cell, and improves cycle life when the cell is reversibly charged and discharged. It may have a substantial electronic

conductivity and/or high specific surface area and small particle or crystallite size.

DESCRIPTION OF DRAWINGS - The figure shows discharge curves for continuous cycling between 2-4.2 V for an electrode and tested to discharge rates of 66.2 C at 42 degreesC in a conventional design using a lithium metal negative electrode and nonaqueous liquid electrolyte.

TECH

INORGANIC CHEMISTRY - Preferred Component: The compound can intercalate alkali and/or hydrogen and can be an n-type conductor. It is free of silicon and has a crystalline structure in which at least one of the M' or M atoms occupy lattice sites coordinated by anion polyhedra forming a continuous network through the structure by sharing vertices, corners, edges, and/or faces. The polyhedra of the continuous network are filled with transition-metals. The compound comprises a mixture of n-type conductor and p-type conductor. It can be a p-type conductor when fully lithiated and n-type conductor when fully delithiated. It has at least one of an ordered or partially disordered structure of olivine (AxMXO₄), NASICON (Ax(M',M)₂(XO₄)₃), VOP₄, LiFe(P₂O₇), or Fe₄(P₂O₇)₃ structure types. It can be LiFePO₄ containing additional metals M. It can have an olivine structure and contains in crystalline solid solution, amongst the metals M' and M, simultaneously metal ions of at least one type is oxidizable and another that is reducible at 23 degreesC or simultaneously the metal ions Fe²⁺ and Fe³⁺, Mn²⁺ and Mn³⁺, Co²⁺ and Co³⁺, Ni²⁺ and Ni³⁺, V²⁺ and V³⁺, or Cr²⁺ and Cr³⁺, with the ion of lesser concentration is at least 10 ppm of the sum of the two ion concentrations. It has an olivine structure with a crystalline solid solution of formula Axvacy(M'1-aMa)XO₄, Ax-a-yMavacyM'XO₄, Ax(M'1-a-yMavacy)XO₄ or Ax-aMaM'1-yvacyXO₄. A is substituted on M2 site of a crystal of the composition at at least 1018/cm³. The composition can be Lix(M'1-aMa)PO₄, LixMaM'PO₄, Lix(M'1-a-yMaLiY)PO₄, or Lix-aMaM'1-yLiYPO₄. It can also be Lixvaci-x(M'1-aMa)PO₄, LixMavaci-a-yM'PO₄, Lix(M'1-a-yMavacy)PO₄, or Lix-aMaM'1-yvacyPO₄. M is partially in solid solution in a crystal structure of the compound at at least 0.01 atom% or at least 0.02 or at least 0.01 mole% relative to the concentration of M'. The compound comprises doped LiFePO₄ in an olivine structure and forms primary crystallites, at least 50% of which have a smallest dimension of less than 500 or less than 10 nm. It is a mixed proton conducting and electronically conducting material, or a gas separation membrane comprising a mixed proton conducting and electronically conducting material comprising LiFePO₄. The alkali metal salt is lithium carbonate or lithium phosphate. The salt of the first-row transition metal is iron oxalate, iron acetate, or iron oxide. The salt of at least one phosphorus, sulfur, arsenic, silicon, aluminum, boron, vanadium, molybdenum and tungsten is ammonium phosphate, lithium phosphate, phosphorus pentoxide, or phosphoric acid. The salt of any of a Group IIA, IIIA, IVA, VA, VIA, VIIA, VIIIA, IB, IIB, IIIB, IVB, VB, and VIB metal is metal alkoxide, metal oxide, metal acetate, or metal nitrate. The salts comprise lithium carbonate, iron oxalate, ammonium phosphate, and an alkoxide of any of Group IIA, IIIA, IVA, VA, VIA, VIIA, VIIIA, IB, IIB, IIIB, IVB, VB, and VIB metal. They can comprise lithium phosphate and alkoxide or oxide of any of a Group IIA, IIIA, IVA, VA, VIA, VIIA, VIIIA, IB, IIB, IIIB, IVB, VB, and VIB metal, or alkoxide of any of magnesium, aluminum, iron, manganese, titanium, zirconium, niobium, tantalum, or tungsten. The gaseous atmosphere is nitrogen gas, argon gas, hydrogen gas, a mixture of nitrogen and hydrogen, or a mixture of carbon monoxide and carbon dioxide gas. The electrode is a sheet or mesh of electronically conductive material coated with a loading of at least 4 or at least 20 mg of the

storage compound/cm squared of projected area of the sheet or mesh. The lithium storage compound is any other than a compound with an ordered or partially disordered rocksalt or spinel structure type, vanadium oxide, or manganese oxide.

vac = a vacancy in any of an M1 and M2 site of the primary crystallites.

Preferred Composition: The compound also includes less than 15 or less than 1 wt.% conductivity-enhancing additive comprising carbon. Preferred Method: The method also includes heat treatment at 300-400 degreesC and 500-900 degreesC. A dopant comprising zirconium, aluminum, iron, carbon, and/or fluorine is added from the milling equipment.

Preferred Property: The compound has a specific surface area of at least 10 or at least 50 m squared/g, a conductivity of at least 10 to the power -7 or at least 10 to the power -2 S/cm. It has a material density of greater than 250 or greater than 350 Wh/kg while charging or discharging at at least 800 mA/g storage compound; greater than 420 or greater than 475 Wh/kg while charging or discharging at at least 30 mA/g storage compound; greater than 400 or greater than 450 Wh/kg while charging or discharging at at least 150 mA/g storage compound; greater than 370 or greater than 400 Wh/kg while charging or discharging at at least 300 mA/g storage compound; greater than 350 or greater than 390 Wh/kg while charging or discharging at at least 750 mA/g storage compound; greater than 270 or greater than 350 Wh/kg while charging or discharging at at least 1.5 A/g storage compound; greater than 150 or greater than 300 Wh/kg while charging or discharging at at least 3 A/g storage compound; greater than 80 or greater than 250 Wh/kg while charging or discharging at at least 4.5 A/g storage compound; greater than 35 Wh/kg while charging or discharging at at least 6 A/g storage compound; greater than 50 or greater than 150 Wh/kg while charging or discharging at at least 7.5 mA/g storage compound; greater than 50 Wh/kg while charging or discharging at 11 A/p storage compound; or greater than 10 or greater than 30 Wh/kg while charging or discharging at at least 15 A/g storage compound.

The electrode has a total thickness of at least 20 or at least 200 microns. The cell exhibits upon discharge an energy of at least 0.25 or at least 100 Wh. It also exhibits upon discharge a gravimetric energy density of at least 30 or at least 2000 W/kg or volumetric power density of at least 100 or at least 200 Wh/L. It can exhibit upon discharge a gravimetric density of at least 30 or 80 Wh/kg at a power density of at least 500 or at least 1000 W/kg.

POLYMERS - Preferred Component: The milling equipment includes polypropylene-bearing, polystyrene-bearing, or milling containers.

ABEX DEFINITIONS - Preferred Definitions: - M = Al, Ti, Zr, Nb, Ta, W, or Mg; - A = Li; - X = P; - D = O; - M' = V, Cr, Mn, Co, Ni, or preferably Fe2+; - x = 0-5, preferably 0-1; - y = 1; - z = 1.

EXAMPLE - A composition Li0.998Nb0.0002FePO4 was prepared using lithium carbonate, niobium phenoxide, iron oxalate, and ammonium dihydrogen phosphate, and heat treated at 350 degreesC for 10 hours under argon atmosphere, and at 700 degreesC for 20 hours under argon atmosphere. The resulting powder was black and conductive and cast as an electrode coating on an aluminum foil current collector. The material had good performance as a storage cathode for rechargeable lithium battery systems, at practical rates of charge and discharge, without requiring special procedures, e.g. coating with conductive additives.

L134 ANSWER 8 OF 17 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
 AN 2003-456349 [43] WPIX Full-text
 CR 2002-066567; 2003-341501; 2005-064887; 2006-078573; 2007-138028;
 2008-A45143; 2008-M48005
 DNC C2003-121332 [43]

DNN N2003-362896 [43]

TI Electrode active material for lithium battery, comprises specific compound comprising lithium or other alkali metals, transition metals, phosphates or similar moieties, and halogen or hydroxyl moieties

DC E37; L03; X16

IN BARKER J; SAIDI M Y; SWOYER J; SWOYER J L

PA (BARK-I) BARKER J; (SAID-I) SAIDI M Y; (SWOY-I) SWOYER J L; (VALE-N) VALENCE TECHNOLOGY INC

CYC 99

PIA US 20030027049 A1 20030206 (200343)* EN 22[0]
 WO 2003038930 A2 20030508 (200343) EN
 EP 1444744 A2 20040811 (200452) EN
 US 6777132 B2 20040817 (200454) EN
 AU 2002337911 A1 20030512 (200464) EN
 CN 1659728 A 20050824 (200604) ZH
 AU 2002337911 A8 20051027 (200624) EN
 KR 2005037485 A 20050422 (200637) KO
 JP 2006516172 W 20060622 (200641) JA 44

ADT US 20030027049 A1 CIP of US 2006-559861 20060427; US 20030027049
 A1 US 2001-14822 20011026; AU 2002337911 A1 AU 2002-337911
 20021018; AU 2002337911 A8 AU 2002-337911 20021018; CN 1659728 A CN
 2002-821019 20021018; EP 1444744 A2 EP 2002-773814 20021018; WO 2003038930
 A2 WO 2002-US33510 20021018; JP 2006516172 W JP 2003-541083 20021018; KR
 2005037485 A KR 2004-706033 20040423; EP 1444744 A2 PCT Application WO 2002-US33510
 2002-US33510 20021018; KR 2005037485 A PCT Application WO 2002-US33510
 20021018; JP 2006516172 W PCT Application WO 2002-US33510 20021018

FDT US 20030027049 A1 CIP of US 6387568 B; EP 1444744 A2 Based on
 WO 2003038930 A; AU 2002337911 A1 Based on WO 2003038930 A; AU
 2002337911 A8 Based on WO 2003038930 A; KR 2005037485 A Based on WO
 2003038930 A; JP 2006516172 W Based on WO 2003038930 A

PRAI US 2001-14822 20011026
 US 2006-559861 20060427

AB US 20030027049 A1 UPAB: 20060119
 NOVELTY - An electrode active material comprises a compound comprising lithium or other alkali metals, transition metals, phosphates or similar moieties, and halogen or hydroxyl moieties.
 DETAILED DESCRIPTION - An electrode active material comprises a metal compound of formula AaMb(XY4)cZd. A = lithium, sodium and/or potassium; a = more than 0 and at most 8; M = metal(s) capable of undergoing oxidation to a higher valence state;
 b = 1-3;
 XY4 = X'O4-xY'x, X'O4-y Y'2y, and/or XS4; X' = phosphorus, arsenic, antimony, silicon, germanium and/or sulfur;
 X = phosphorus, arsenic, antimony, silicon and/or germanium; Y' = halogen;
 x = at least 0 and less than 3; y = more than 0 and less than 4; c = more than 0 and at most 3; Z = hydroxyl and/or halogen; and d = more than 0 and at most 6, and M, X-Z, a-d, X and Y are selected so as to maintain electroneutrality of compound. INDEPENDENT CLAIMS are included for the following: (1) an electrode comprising a binder, an electrically conductive carbonaceous material and active material; and (2) a lithium battery comprising a first electrode comprising active material, a second electrode which is a counter-electrode to first electrode, and an electrolyte between electrodes.
 USE - For a lithium battery (claimed).
 ADVANTAGE - The electrode active material provides battery with increased capacity, enhanced cycling capability, enhanced reversibility and reduced cost.

TECH INORGANIC CHEMISTRY - Preferred Active Material: The active material has an olivine structure or a NASICON structure.

Preferably, the electrode active material comprises metal compound of formula $\text{Li}a\text{Mb}(\text{PO}_4)_2\text{Zd}$.

a = more than 0.1 and at most 4, preferably 2;

M = M'M, where M' is transition metal(s) from groups 4-11, preferably iron, cobalt, manganese, copper, vanadium and/or chromium, and M is element from group 2, 3, 12, 13 and/or 14, preferably magnesium, calcium, zinc, barium and/or aluminum;

b = 1-3;

Z = halogen, preferably fluorine; and

d = more than 0.1 and at most 4.

ABEX DEFINITIONS - Preferred Definitions: - c = 1 or 3; - a and d = 0.1-3, preferably 1-3, or 2-6, preferably 3-6; - A = lithium, mixture of sodium and potassium, mixture of sodium, potassium and lithium, or sodium; - M = transition metals from groups 4-11, preferably iron, cobalt, nickel, manganese, copper, vanadium, zirconium, titanium or chromium, and comprises M'M; - M' = transition metal from groups 4-11, preferably iron, cobalt, manganese, copper, vanadium, and/or chromium; - M = element of group 2, 3, 12, 13 or 14, preferably magnesium, calcium, zinc, barium and/or aluminum; - X' = arsenic, antimony, silicon, germanium and/or sulfur, preferably silicon; - X = arsenic, antimony, silicon and/or germanium, preferably silicon; - $\text{XY}_4 = \text{X}'\text{O}_4 - \text{xY}'\text{x}$, $\text{X}'\text{O}_4 - \text{yY}'_2\text{y}$, and/or XS_4 , preferably XS_4 , where X' and X are phosphorus, Y' is fluorine, x is more than 0 and less than 3 and y is more than 0 and less than 4; and - Z = hydroxyl or fluorine.

SPECIFIC COMPOUNDS - The metal compound is $\text{Li}_2\text{CoPO}_4\text{F}$ or $\text{Li}_2\text{FePO}_4\text{F}$ or $\text{Li}_2\text{Fe}_0.9\text{Mg}_0.1\text{PO}_4\text{F}$ (claimed). Several specific metal compounds are disclosed such as $\text{Li}_2\text{Fe}_0.8\text{Mg}_0.2\text{PO}_4\text{F}$, and $\text{Li}_2\text{Fe}_0.5\text{Co}_0.5\text{PO}_4\text{F}$.

EXAMPLE - A mixture of lithium carbonate (in grams) (36.95), nickel phosphate ($\text{Ni}_3(\text{PO}_4)_2 \cdot 7\text{H}_2\text{O}$) (164.01), and ammonium hydrogen phosphate ($\text{NH}_4)_2\text{HPO}_4$) (44.11), was pelletized, heated at 800 degrees C and maintained at 800 degrees C for 16 hours. A lithium nickel phosphate (LiNiPO_4) as precursor formed was cooled to ambient temperature. The precursor (160.85) was reacted with lithium fluoride (25.94) to form a lithium compound ($\text{Li}_2\text{NiPO}_4\text{F}$) as an electrode active material. A cathode electrode was formed using the electrode active material. A battery comprising cathode, lithium metal anode and an electrolyte, was formed.

L134 ANSWER 9 OF 17 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
 AN 2003-341501 [32] WPIX Full-text
 CR 2002-066567; 2003-456349; 2005-064887; 2006-078573; 2007-138028;
 2008-A45143; 2008-M48005
 DNC C2003-089558 [32]
 DNN N2003-273176 [32]
 TI Electrode active material for lithium battery, comprises
 specific compound comprising lithium or other alkali metals,
 transition metals, phosphates or similar moieties, and halogen or hydroxyl
 moieties
 DC L03; X16
 IN BARKER J; SAIDI M Y; SWOYER J L
 PA (BARK-I) BARKER J; (SAID-I) SAIDI M Y; (SWOY-I) SWOYER J L; (VALE-N)
 VALENCE TECHNOLOGY INC
 CYC 1
 PIA US 20030013019 A1 20030116 (200332)* EN 22[0]
 US 6964827 B2 20051115 (200575) EN
 ADT US 20030013019 A1 CIP of US 2000-559861 20060427; US 20030013019
 A1 US 2001-45685 20011107; US 6964827 B2 CIP of US
 2000-559861 20000427; US 6964827 B2 CIP of US 2001-14822
 20011026; US 6964827 B2 US 2001-45685 20011107
 FDT US 20030013019 A1 CIP of US 6387568 B; US 6964827 B2 CIP of US 6387568 B;

US 6964827 B2 CIP of US 6777132 B
 PRAI 05 2001-45685 20011107
 US 2000-559861 20000427
 US 2001-14822 20011026

AB US 20030013019 A1 UPAB: 20060202

NOVELTY - An electrode active material comprises a compound comprising lithium or other alkali metals, transition metals, phosphates or similar moieties, and halogen or hydroxyl moieties.

DETAILED DESCRIPTION - An electrode active material comprises a metal compound of formula $AaMb(XY_4)_cZd$. A = lithium, sodium and/or potassium; a = more than 0 and less than 8; M = metal(s) capable of undergoing oxidation to a higher valence state;
 b = 1-3;
 $XY_4 = X'O_4-xY'_x$, $X'O_4-y Y'_2y$, and/or XS_4 ; X' = phosphorus, arsenic, antimony, silicon, germanium and/or sulfur;
 X = phosphorus, arsenic, antimony, silicon and/or germanium; Y' = halogen;
 x = 0-3;
 y = more than 0 and less than 4; c = more than 0 and at most 3; Z = hydroxyl and/or halogen; and d = more than 0 and less than 6, and M, X-Z, a-d, X and Y are selected so as to maintain electroneutrality of compound. INDEPENDENT CLAIMS are included for the following: (1) an electrode comprising a binder, an electrically conductive carbonaceous material and active material; and (2) a lithium battery comprising a first electrode comprising active material, a second electrode which is a counter-electrode to first electrode, and an electrolyte between electrodes.

USE - For a lithium battery (claimed).

ADVANTAGE - The electrode active material provides battery with increased capacity, enhanced cycling capability, enhanced reversibility and reduced cost.

TECH INORGANIC CHEMISTRY - Preferred Active Material: The active material has an olivine structure or a NASICON structure. Preferably, the electrode active material comprises metal compound of formula $LiaMb(PO_4)_dZd$.
 a = more than 0.1 and at most 4, preferably 2;
 M = M'1-mMm, preferably iron, cobalt and/or manganese, where M' is transition metal(s) from groups 4-11, preferably iron, cobalt, manganese, copper, vanadium and/or chromium, M is element from group 2,3,12,13 and/or 14, preferably magnesium, calcium, zinc, barium and/or aluminum, and m is more than 0 and less than 1;
 b = 1-3;
 Z = halogen, preferably fluorine; and
 d = more than 0.1 and at most 4.

ABEX DEFINITIONS - Preferred Definitions: - c = 1 or 3; - a and d = 0.1-3, preferably 1-3, or 2-6, preferably 3-6; - A = lithium, mixture of sodium and potassium, mixture of sodium, potassium and lithium, or sodium; - M = transition metals from groups 4-11, preferably iron, cobalt, nickel, manganese, copper, vanadium, zirconium, titanium or chromium, and comprises M'1-mMm; - M' = transition metal from groups 4-11, preferably iron, cobalt, manganese, copper, vanadium, and/or chromium; - M = element of group 2,3,12,13 or 14, preferably magnesium, calcium, zinc, barium and/or aluminum; - m = more than 0 and less than 1; - X' = arsenic, antimony, silicon, germanium and/or sulfur, preferably silicon; - X = arsenic, antimony, silicon and/or germanium, preferably silicon; - $XY_4 = X'O_4-xY'_x$, $X'O_4-y Y'_2y$, and/or XS_4 , preferably XS_4 , where X' and X are phosphorus, Y' is fluorine, x is more than 0 and less than 3 and y is more than 0 and less than 4; and - Z = hydroxyl or fluorine.

SPECIFIC COMPOUNDS - The metal compound is Li_2CoPO_4F or Li_2FePO_4F or $Li_2Fe_0.9Mg_0.1PO_4F$ (claimed). Several specific metal compounds are disclosed such as $Li_2Fe_0.8Mg_0.2PO_4F$, and $Li_2Fe_0.5Co_0.5PO_4F$.

EXAMPLE - A mixture of lithium carbonate (in grams) (36.95), nickel phosphate ($\text{Ni}_3(\text{PO}_4)_2 \cdot 7\text{H}_2\text{O}$) (164.01), and ammonium hydrogen phosphate ($\text{NH}_4\text{H}_2\text{PO}_4$) (44.11), was pelletized, heated at 800degreesC and maintained at 800degreesC for 16 hours. A lithium nickel phosphate (LiNiPO_4) as precursor formed was cooled to ambient temperature. The precursor (160.85) was reacted with lithium fluoride (25.94) to form a lithium compound ($\text{Li}_2\text{NiPO}_4\text{F}$) as an electrode active material. A cathode electrode was formed using the electrode active material. A battery comprising cathode, lithium metal anode and an electrolyte, was formed.

L134 ANSWER 10 OF 17 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN

AN 2003-275761 [27] WPIX Full-text

DNC C2003-072485 [27]

DNN N2003-219002 [27]

TI Carbon-containing lithium-iron composite phosphorus oxide useful as a lithium secondary battery positive electrode active material comprises particles having an olivine structure and carbonaceous fine particles

DC L03; X16; X22

IN KANZAKI M; KOHZAKI M; TAKEUCHI Y; UKIYOU Y; UKYO Y

PA (TOY-W-C) TOYOTA CHUO KENKYUSHO KK

CYC 2

PIA US 20020182497 A1 20021205 (200327)* EN 11[2]

JP 2003034534 A 20030207 (200327) JA 8

US 7025907 B2 20060411 (200626) EN

JP 4186507 B2 20081126 (200880) JA 11

ADT US 20020182497 A1 US 2002-143946 20020514; JP 2003034534 A

JP 2002-132603 20020508; JP 4186507 B2 JP 2002-132603

20020508

FDT JP 4186507 B2 Previous Publ JP 2003034534 A

PRAI JP 2001-145396 20010515

AB US 20020182497 A1 UPAB: 20060119

NOVELTY - A carbon-containing lithium-iron composite phosphorus oxide (A) comprises particles (p1) having an olivine structure whose basic composition is LiFePO_4 and carbonaceous fine particles (p2).

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for the following:

(1) production of (A) involving mixing a lithium, iron, phosphorus containing ammonium salt sources and (p2), and calcining the mixture at 600 - 750 (preferably 620 - 700)degreesC; and (2) a lithium secondary battery comprising a positive electrode including (A).

USE - As a lithium secondary battery positive electrode active material (claimed).

ADVANTAGE - (A) has a large discharge capacity per active material using which a lithium secondary battery can maintain its capacity even when it is charged and discharged repeatedly and thus is less likely to suffer from the cycle deterioration. (A) has much more conductive paths so that the internal resistance decreases. It is possible to suppress the oxidation of Fe^{2+} to Fe^{3+} and to inhibit the grain growth and sintering of (A). The diffusion distance of lithium ions is shortened so that the dope and undope reactions of lithium ions are activated, thus it is possible to augment the capacity of the resultant lithium secondary battery.

TECH

ORGANIC CHEMISTRY - Preferred Components: (p2) have an average particle diameter of 5 - 100 nm. (p2) comprise carbon black. A molar ratio of carbon atoms in (p2) with respect to lithium atoms is 0.02 - 0.2.

INORGANIC CHEMISTRY - Preferred Oxide: (A) has particles having an average particle diameter of 0.2 - 5 μm . (A) is expressed by a composition formula $\text{LiFe}_{1-x}\text{MxPO}_4$.

M = Mn, Mg, Ni, Co, Cu, Zn or Ge (preferably Mn);
 $x = 0.02 - 0.2$ (preferably $0.05 - 0.15$).
 Preferred Components: The lithium source is Li_2CO_3 , iron source is $\text{FeC}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ and phosphorus source is $\text{NH}_4\text{H}_2\text{PO}_4$. LiH_2PO_4 acts as a source of lithium as well as phosphorus.
 Preferred Method: The calcining step is carried out in an inert or in a reducing atmosphere.

ABEX EXAMPLE - Carbon-containing lithium-iron composite phosphorus oxides expressed by a ratio $\text{LiFe}_1\text{-xMnxPO}_4\text{:Cy}$ (where $x = 0.15$ by mol and y was 0, 0.02, 0.05 or 0.1 by mol) was prepared. LiH_2PO_4 was used as the lithium source as well as the phosphorus source, $\text{FeC}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ was used as iron source, MnCO_3 was used as the substitution element source and carbon black having average particle size of 24 nm was used as the carbonaceous fine particles. Firstly $\text{FeC}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ and MnCO_3 were mixed so that the ratio of $\text{FeC}_2\text{O}_4 \cdot 2\text{H}_2\text{O}:\text{MnCO}_3$ was $0.85:0.15$ by molar ratio. To the mixture LiH_2PO_4 and carbon black were added so that the ratio of $\text{Li}:(\text{Fe}+\text{Mn}):C$ was $1:1:0$, $1:1:0.02$, $1:1:0.05$ or $1:1:0.1$. All the mixtures were calcined at 650°C for 6 hours. - The resulting carbon-containing as well as carbon-free oxides were pulverized to powder form, which had an average particle diameter of 1 μm . The oxides were used to manufacture lithium secondary batteries, of which active material charge- and discharge capacities were measured. - The lithium-iron composite phosphorus oxides (carbon-containing/carbon-free) exhibited the initial active material discharge capacity (mAh/g) of 88/80 and showed a high capacity retention rate (%) of 84/77 after 500 cycles. Thus carbon-containing lithium-iron composite phosphorus oxides showed not only the higher active material discharge capacity initially but also the capacity lowered less.

L134 ANSWER 11 OF 17 WPIX COPYRIGHT 2009 THOMSON REUTERS ON STN
 AN 2003-019583 [01] WPIX Full-text
 CR 1999-132582; 1999-357431; 1999-370647; 1999-429752; 2000-062635;
 2000-246515; 2000-376357; 2000-376415; 2000-506085; 2000-672472;
 2001-112725; 2001-316423; 2001-355518; 2002-026044; 2002-098271;
 2002-362206; 2002-426426; 2002-478441; 2002-527743; 2002-608426;
 2003-067701; 2003-312766; 2003-371975; 2003-617018; 2003-853896;
 2004-096918; 2004-386878; 2004-498808; 2005-519251; 2006-017868;
 2006-470729; 2006-520050; 2007-523938; 2008-G98200
 DNC C2003-005082 [01]
 DNN N2003-015017 [01]
 TI Collection of particles such as lithium metal phosphate for
 coatings and use as electro-active material for battery electrodes, has
 preset average particle size and comprises crystalline
 composition of phosphate anion
 DC L03; X16
 IN BI X; CHALONER-GILL B; HORNE C R; MOSSO R J; PINOLI A A
 PA (BIXX-I) BI X; (CHAL-I) CHALONER-GILL B; (HORN-I) HORNE C R; (MOSS-I)
 MOSSO R J; (NEOP-N) NEO PHOTONICS CORP; (PINO-I) PINOLI A A
 CYC 98
 PIA WO 2002089233 A2 20021107 (200301)* EN 59[21]
 US 20020192137 A1 20021219 (200303) EN
 AU 2002338575 A1 20021111 (200433) EN
 ADT WO 2002089233 A2 WO 2002-0912069 20020418; US 20020192137 A1
 US 2001-045965 20010430; AU 2002338575 A1 AU 2002-338575
 20020418
 FDT AU 2002338575 A1 Based on WO 2002089233 A
 PRAT US 2001-045985 20010430
 AB WO 2002089233 A2 UPAB: 20060118
 NOVELTY - The collection of particles has average particle size less than 1000
 nm and comprises a crystalline composition of phosphate anion.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for the following:

- (1) Battery;
- (2) Method for producing the particles; (3) Production of lithium iron phosphate; and (4) Method of coating a substrate.

USE - For use as electro-active material for battery electrodes and in coatings.

ADVANTAGE - Batteries based on lithium metal phosphate nanoparticles have desired performance, especially good cycle-ability. The nanoparticles produce smoother electrodes. Crystalline lithium ion phosphate has olivine structure that allows a high diffusion rate of lithium which leads to corresponding high battery rate.

DESCRIPTION OF DRAWINGS - The figure shows a schematic perspective view of the battery.

TECH

INORGANIC CHEMISTRY - Preferred Property: The collection of particles has an average particle size of 5-250 nm, preferably 5-100 nm.

Preferred Composition: The collection of particles comprises several metals, preferably at least three metals of composition Li_xFePO_4 where $x = 0.1 - 1$, $\text{LiFe}_1-x\text{MnxPO}_4$ where $x = 1 - 0.8$, preferably $x = 0.4 - 0.8$, MxPO_4 , where M is a metal, x no more than 4 and $\text{Fe}_3(\text{PO}_4)_2$, preferably FePO_4 .

L134 ANSWER 12 OF 17 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
 AN 2002-519092 [55] WPIX Full-text
 CR 2002-519093
 DNC C2002-146764 [55]
 DNN N2002-410935 [55]
 TI Synthesis of carbon coated redox materials of controlled size based on lithium bimetallic phosphates, sulfates or silicates, useful in primary and secondary batteries and supercapacity generators
 DC A85; E37; L03; P73; P81; X16
 IN ARMAND M; GAUTHIER M; GAUTHIER M; MAGNAN J; RAVET N
 PA (ARMA-I) ARMAND M; (CNRS-C) CNRS; (GAUT-I) GAUTHIER M; (HYDR-N) HYDRO-QUEBEC; (MAGN-I) MAGNAN J; (RAVE-I) RAVET N; (UYMO-N) UNIV MONTREAL
 CYC 96
 PIA WO 2002027823 A1 20020404 (200255)* FR 83[18] <--
 AU 2001093568 A 20020408 (200255) EN <--
 CA 2320661 A1 20020326 (200255) FR <--
 EP 1325525 A1 20030709 (200345) FR
 KR 2003045791 A 20030611 (200370) KO
 US 20040033360 A1 20040219 (200414) EN
 JP 2004509447 W 20040325 (200422) JA 116
 CN 1478310 A 20040225 (200436) ZH
 ADT WO 2002027823 A1 WO 2001-CA1349 20010921; CA 2320661 A1 CA 2000-2320661 20000926; AU 2001093568 A AU 2001-93568 20010921; CN 1478310 A CN 2001-816319 20010921; EP 1325525 A1 EP 2001-973906 20010921; EP 1325525 A1 WO 2001-CA1349 20010921; US 20040033360 A1 WO 2001-CA1319 20010921; JP 2004509447 W WO 2001-CA1349 20010921; JP 2004509447 W JP 2002-531517 20010921; KR 2003045791 A KR 2003-703056 20030228; US 20040033360 A1 US 2003-362763 20030619
 FDT AU 2001093568 A Based on WO 2002027823 A; EP 1325525 A1 Based on WO 2002027823 A; JP 2004509447 W Based on WO 2002027823 A
 PRAI CA 2000-2320661 20000926
 AB WO 2002027823 A1 UPAB: 20060120
 NOVELTY - Preparation of a carbon-bridged compound containing a transition metal, a fixed valency metal and lithium in the form of a phosphate, sulfate or silicate.
 DETAILED DESCRIPTION - Synthesis of compounds of formula $\text{CLi}_x\text{M}_1-\text{yM}_2(\text{XO}_4)_n$ (A) comprises equilibrating in the required proportions an intimate and/or homogeneous mixture comprising: (a) a source of M in an oxidation state

greater or less than that of the metal in the final compound; (b) a source of element M1;
 (c) a source of lithium;
 (d) optionally a source compound of X; and (e) a source of conductive carbon.
 C = bridged carbon to the compound $\text{CLixM1-yMly(XO4)}_n$; $x = 0-2$;
 $y = 0-0.6$;
 $n = 1-1.5$;
 M = transition metal or mixture of the first series of the periodic table;
 M1 = Mg^{2+} , Ca^{2+} , Al^{3+} or Zn^{2+} or a combination of these; X = S, P or Si
 The sources M, M1, Li and X may be introduced in at least one stage and the synthesis takes place in thermodynamic or kinetic equilibrium in the desired proportions in a gaseous atmosphere so as to impose the oxidation state of the transition metal to the desired degree of valence; preferably this valence is 2 for Fe, Mn, Co, Ni and 3 or 4 for Ti and V. This is controlled by the composition of the gaseous atmosphere, the reaction temperature and the amount of the source (c) compound relative to (a), (b) and (d). The process includes a stage of pyrolysis of compound (e) to obtain a compound for which the electronic conductivity, measured on the compacted powder at a pressure greater or equal to 3000, preferably 3750 Kg.cm⁻², is greater than 10⁻⁸ S.cm⁻¹. INDEPENDENT CLAIMS are also included for the compounds (A) obtained and electrochemical cells containing the materials.
 USE - The synthesized compounds are used in the preparation of electrodes which allow redox reactions by exchange of Li ions and electrons; these are used in primary or secondary batteries and supercapacity generators, and in light modulation systems.
 ADVANTAGE - The reduction of Fe(III) to Fe(II) is essentially due to the action of the reducing atmosphere, the kinetics of reduction by the solid carbon being unfavorable. The C content in the final product thus corresponds to the decomposition yield of the organic compound. DESCRIPTION OF DRAWINGS - The figure shows plots of voltammetry cycles obtained at 80 degreesC. for a battery containing non-carbonized LiFePO4 compared with a carbonized sample. (Drawing includes non-English language text).

TECH

INORGANIC CHEMISTRY - Preferred Process: The synthesis between sources (a)-(d) is effected either simultaneously with the pyrolysis of (e) in two stages, pyrolysis following preferably in a reducing or neutral atmosphere.
 The A compounds are obtained as particles of size and form determined by the size and form of the precursor mixture, and more preferably the size and form of precursors of M and M1. The preferred size is 0.1-10 microns.
 The size and form of the A particles differs by no more than 80% of that of precursors (a) and (b).
 The content of the carbon source is such as to coat part of the surface area of the A particles (at least 30%) and is preferably less than 5%, more preferably 3%, of the wt. of A.
 The content is chosen to inter-link the A particles to form agglomerates of 1-20 microns, the content of inter-linked carbon being less than 3% of A.
 The technique for forming the precursor mixture may be atomization, precipitation, coprecipitation, agglomeration and/or pelletization ; more preferably atomization, the final form of A being spherical agglomerates of 1-30 microns dimensions.
 The conductive carbon source is a compound of which the pyrolysis releases CO and/or CO2 and/or H2 and water vapor, such as to create locally a reducing atmosphere in the synthesis of A.
 Suitable sources are polyethylene, polypropylene, glucose, fructose, sucrose, xylose, sorbose, starch, cellulose and esters, block polymers of ethylene and ethylene oxide and furfuryl alcohol.
 The sources (a)-(d) are in powder form or partly compacted prior

to synthesis to increase the contact points between reactants and increase the density of the final product, also permitting reaction with the gaseous phase.

The carbon source is present in the compacting stage.

The synthesis is conducted continuously in a reactor such as a rotary furnace or fluidized bed; the flow rate of solid is greater than 1 kg/h, the temperature 650-800 degreesC. and dwell time less than 5 hs and more preferably less than 30 mins.

The reducing atmosphere is such as to reduce the oxidation state of M to the required level, but not to the neutral metallic state.

The atmosphere comprises a mixture CO/CO₂ or H₂/H₂O, NH₃/H₂O or mixtures. The reducing atmosphere can be obtained by decomposition under vacuum or in an inert atmosphere of an organic compound or mixture of compounds. It may also be obtained by partial oxidation of a hydrocarbon, such as reformed gas obtained from methane or propane.

The electrochemical capacity of the compound A in which n = 1 is greater than 150 mAh/g, measured for specific intensities greater than 10 mA/g. Preferred sources of M are magnetite, MnO₂, V₂O₅, ferric phosphate, Fe/Li hydroxyphosphate or ferric nitrate or a mixture of these.

A preferred Li source is Li₂CO₃.

The X source is chosen from H₂SO₄, Li₂SO₄, H₃PO₄ or esters, Li₃PO₄ or LiH₂PO₄, mono- or di-ammonium phosphate, NH₄MnPO₄, silica, Li silicates. and alkoxysilanes.

The compounds of formula A have an olivine or Nasicon structure, including the monoclinic form.

The reaction parameters are chosen so that the conductive carbon is not consumed during the process, the source content being 0.3-1.5% of the total reaction mass.

The temperature and time of synthesis are a function of the nature of the transition metal and are such that the metal is not reduced as far the metallic state and the carbon resulting from pyrolysis is not completely oxidized.

A process is claimed in which A is LiMP₄, more particularly LiFeP₄, in which the core of the particles obtained is essentially (at least 95%) LiFeP₄ with 0.2-5% of conductive carbon.

Claimed Materials: Materials of formula (A) are claimed, as synthesized above, comprising a nucleus and coating and/or bridging of carbon having:

(1) a conductivity greater than 10⁻⁸ S./cm, measured on a powder sample compacted at 3750 Kg.cm⁻¹; -a carbon content of 0.2-5%, preferably 0.3-2%; and-a particle size of 0.05-15 (preferably 0.1-10) microns.

Claimed Electrochemical Cell: An electrochemical cell is claimed comprising two electrodes and an electrolyte, one electrode being of a material A.

The electrolyte is a polymer optionally gellified by a polar liquid containing a lithium salt.

Preferably the negative electrode is Li or a Li alloy and the positive electrode contains a compound A, alone or mixed with a double oxide of Co and Li or a complex LiNi oxide.

The cell can function as a primary or secondary generator, as a super capacity generator or as a light modulation system.

As a super capacity generator, the positive electrode is in the form of carbon fibre or powder.

Claimed Light Modulation System: In a light modulation system, the optically inactive counter-electrode is a material of formula A(LiFeP₄) as a thin layer on a glass or polymer support and covered with a doped oxide of Sn or In.

ABEX EXAMPLE - LiFeP₄ is synthesized from iron phosphate in a reducing atmosphere. LiFeP₄ was prepared by the reaction of FeP₄.2H₂O and Li₂CO₃ in the presence of H₂. In the first stage the stoichiometric quantities of

the two compounds were milled together in isopropanol, then progressively heated (6 degreesC. per min up to 700 degreesC) in a tubular furnace under a reducing gas (8% H₂ in argon). The temperature was maintained for 1 h then the sample cooled at 15 degreesC per min. During all the thermal treatment the flow of reducing gas was maintained, the total time being 3 h 30 min. - The structure of the product was verified by X-ray diffraction to be triphylite LiFePO₄; the electronic conductivity was too low for measurement. - The triphylite obtained was impregnated with a solution of cellulose acetate in acetone, giving a total weight of 5% cellulose acetate relative to treated triphylite. After drying, the mixture was placed in the furnace under argon and heated to 700 degreesC as before. The sample was then cooled under argon. The sample contained 1% carbon, corresponding to a carbonization yield of cellulose acetate of 20%. The material showed a surface conductivity, which was measured on a compacted pastille of 1.3 cm diameter to which a force of 5 tonnes was applied. The electronic conductivity was found to be 5x10⁻⁵ S.cm⁻¹.

L134 ANSWER 13 OF 17 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
 AN 2002-458947 [49] WPIX [Full-text](#)
 DNC C2002-130937 [49]
 DNN N2002-362048 [49]
 TI Lithium ion composite oxide for lithium secondary
 battery positive electrode active material, useful in communication
 apparatus, crystal structure being olivine structure
 DC L03; X16
 IN KANZAKI M; TAKEUCHI Y; UKIYOU Y
 PA (TOYW-C) TOYOTA CHUO KENKYUSHO KK
 CYC 1
 PIA JP 2002117845 A 20020419 (200249)* JA 8[4] <--
 ADT JP 2002117845 A JP 2000-307685 20001006
 PRAI JP 2000-307685 20001006
 AB JP 2002117845 A UPAB: 20060119
 NOVELTY - Lithium iron composite oxide for a lithium secondary battery
 positive electrode active material is represented by a composition formula,
 and its crystal structure is olivine structure.
 DETAILED DESCRIPTION - A composition formula is LiFe_{1-x}M_xPO₄, wherein M is
 at least one kind selected from Mn, Mg, Ni, and Co.
 USE - Useful in a communication apparatus and an information related apparatus
 field.
 ADVANTAGE - Active material discharge capacity is high and crystal structure
 is stabilized.
 ABEX EXAMPLE - LiFe_{1-x}M_xPO₄ is M, i.e., at least one kind selected from Mn,
 Mg, Ni, and Co and a part of a Fe site is substituted. The elements have
 the approximately same ion radius as that of Fe and oxidized and reduced
 at a potential different from that of Fe, whereby by substituting a part
 of a Fe site with at least one kind of the element, crystal
 structure can be stabilized. Especially, it is desirable that a
 substitution element M is Mn owing to a reason that it is abundant in a
 resource.

L134 ANSWER 14 OF 17 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
 AN 2001-581595 [65] WPIX [Full-text](#)
 CR 2002-453607; 2003-662111
 DNC C2001-172350 [65]
 DNN N2001-433290 [65]
 TI New lithium-based electrochemically active material useful as
 electrode active materials
 DC E31; L03; X16
 IN BARKER J; SAIDI M Y; SAIDI Y M
 PA (BARK-I) BARKER J; (SAID-I) SAIDI M Y; (VALE-N) VALENCE TECHNOLOGY INC

CYC 93
PIA WO 2001054212 A1 20010726 (200165)* EN 97[23] <--
AU 2001029134 A 20010731 (200171) EN <--
EP 1252671 A1 20021030 (200279) EN
KR 2002070486 A 20020909 (200311) KO
US 20030077514 A1 20030424 (200330) EN
EP 1309021 A2 20030507 (200332) EN
JP 2003520182 W 20030702 (200352) JA 84
CN 1425205 A 20030618 (200358) ZH
JP 2003223893 A 20030808 (200361) JA 30
US 20030129492 A1 20030710 (200362) EN 40[23]
EP 1252671 B1 20040303 (200417) EN
DE 60008801 E 20040408 (200425) DE
CA 2460875 A1 20010726 (200442) EN <--
CA 2394318 C 20041207 (200481) EN
US 6884544 B2 20050426 (200528) EN
US 20050186476 A1 20050825 (200556) EN
US 7001690 B2 20060221 (200615) EN
US 7026072 B2 20060411 (200626) EN
KR 501861 B 20050720 (200660) KO
US 20070065724 A1 20070322 (200723) EN
IN 2002CN01088 P4 20070406 (200735) EN
CA 2460875 C 20070911 (200763) EN
CA 2596239 A1 20010726 (200777) EN <--
CN 100338799 C 20070919 (200828) ZH
IN 2006CN04735 P4 20070629 (200836) EN
US 7438992 B2 20081021 (200875) EN
JP 4191467 B2 20081203 (200902) JA 33
ADT WO 2001054212 A1 WO 2000-US35302 20001222; US 20030077514 A1 Div
Ex US 2000-484799 20000118; US 20030129492 A1 US
2000-484799 20000118; US 6884544 B2 Div Ex US 2000-484799
20000118; US 20050186476 A1 Cont of US 2000-484799 20000118
; US 7001690 B2 US 2000-484799 20000118; US 7026072 B2 Cont of
US 2000-484799 20000118; US 20070065724 A1 Cont of US
2000-484799 20000118; US 7438992 B2 Cont of US 2000-484799
20000118; CA 2460875 A1 Div Ex CA 2000-2394318 20001222; CA
2394318 C CA 2000-2394318 20001222; CA 2460875 C Div Ex CA
2000-2394318 20001222; CA 2460875 A1 CA 2000-2460875 20001222
; CA 2460875 C CA 2000-2460875 20001222; CA 2596239 A1 Div Ex
CA 2000-2460875 20001222; CA 2596239 A1 CA 2000-2596239
20001222; CN 1425205 A CN 2000-818502 20001222; CN
100338799 C CN 2000-818502 20001222; DE 60008801 E DE
2000-60008801 20001222; EP 1252671 A1 EP 2000-993800 20001222
; EP 1309021 A2 Div Ex EP 2000-993800 20001222; EP 1252671 B1
EP 2000-993800 20001222; DE 60008801 E EP 2000-993800
20001222; EP 1252671 A1 PCT Application WO 2000-US35302
20001222; JP 2003520182 W PCT Application WO 2000-US35302
20001222; EP 1252671 B1 PCT Application WO 2000-US35302
20001222; DE 60008801 E PCT Application WO 2000-US35302
20001222; CA 2394318 C PCT Application WO 2000-US35302
20001222; KR 501861 B PCT Application WO 2000-US35302
20001222; IN 2002CN01088 P4 PCT Application WO 2000-US35302
20001222; IN 2006CN04735 P4 PCT Application WO 2000-US35302
20001222; AU 2001029134 A AU 2001-29134 20001222; JP
2003520182 W JP 2001-553602 20001222; JP 2003223893 A Div Ex
JP 2001-553602 20001222; IN 2006CN04735 P4 Div Ex IN
2002-CN1088 20001222; JP 2003223893 A JP 2002-262497 20001222
; IN 2002CN01088 P4 IN 2002-CN1088 20020716; KR 2002070486 A KR
2002-709258 20020718; KR 501861 B KR 2002-709258 20020718; US 20030077514
A1 US 2002-304890 20021125; US 6884544 B2 US 2002-304890 20021125; EP

1309021 A2 EP 2003-2687 20001222; EP 1252671 B1 Related to
 EP 2003-2687 20001222; US 20050186476 A1 US 2005-907880 20050419;
 US 7026072 B2 US 2005-907880 20050419; US 20070065724 A1 Cont of US
 2005-907880 20050419; US 7438992 B2 Cont of US 2005-907880 20050419; US
 20070065724 A1 US 2006-355584 20060216; US 7438992 B2 US 2006-355584
 20060216; IN 2006CN04735 P4 IN 2006-CN4735 20061222; JP 4191467 B2 Div Ex
 JP 2001-553602 20001222; JP 4191467 B2 JP 2002-362497 20021213

FDT EP 1309021 A2 Div ex EP 1252671 A; DE 60008801 E Based on EP
 1252671 A; EP 1252671 B1 Related to EP 1309021 A; KR 501861
 B Previous Publ KR 2002070486 A; US 20070065724 A1 Cont of US 7001690
 B; US 7438992 B2 Cont of US 7001690 B; US 20070065724 A1 Cont
 of US 7026072 B; US 7438992 B2 Cont of US 7026072 B; AU
 2001029134 A Based on WO 2001054212 A; EP 1252671 A1 Based on WO
 2001054212 A; JP 2003520182 W Based on WO 2001054212 A; EP 1252671
 B1 Based on WO 2001054212 A; DE 60008801 E Based on WO 2001054212
 A; CA 2394318 C Based on WO 2001054212 A; KR 501861 B Based
 on WO 2001054212 A; JP 4191467 B2 Previous Publ JP 2003223893 A

PRAI US 2000-484799 20000118
 US 2002-304890 20021125
 US 2005-907880 20050419
 US 2006-355584 20060216

AB WO 2001054212 A1 UPAB: 20060117
 NOVELTY - A lithium-mixed metal phosphate material is new.
 DETAILED DESCRIPTION - A lithium-mixed metal phosphate compound of formula
 $\text{LiMI}_1\text{-yMI}_2\text{PO}_4$ is new. MI = Groups 4-11 (Periodic table) transition metal
 having a valence of +2;
 MII = Groups 2, 12, 14 (Periodic table) metallic element(s) having a valence
 of +2;
 $y = 0-1$
 INDEPENDENT CLAIMS are also included for: (A) a new lithium-mixed metal
 material, i.e. lithium vanadium pentoxide (LiV_2O_5) produced using the same
 method of producing lithium-mixed metal phosphate; (B) an electrode comprising
 a binder, an electrically conductive carbonaceous material, and the lithium-
 mixed metal phosphate compound or the lithium vanadium pentoxide; and (C) a
 lithium ion battery comprising the electrode, a second electrode which is a
 counter-electrode to the first electrode, and an electrolyte. LiV_2O_5 has an
 orthorhombic crystal structure with $a = 9.7 \pm 0.2$ Angstrom, $b = 3.6 \pm 0.2$
 Angstrom, and $c = 10.6 \pm 0.2$ Angstrom.
 USE - As electrode active materials for battery cathodes and cells.
 ADVANTAGE - The material improves the capacity, capacity retention, and
 performance of the cells. It can be prepared in an economical manner that is
 readily adaptable to commercial production. The material is stable in an as-
 prepared condition, in the presence of air and particularly humid air. It
 thus, facilitates preparation of and assembly of battery cathodes and cells,
 without the requirement for controlled atmosphere.

TECH INORGANIC CHEMISTRY - Preferred Property: The active material has an
 olivine structure. Preparation: The lithium-mixed metal
 phosphate is prepared by providing in particle form lithium
 -containing compound, metal(s)-containing compound, compound capable of
 providing phosphate, anion, and carbon; mixing precursor compounds with
 carbon; and initiating reaction of the reactants with heat.

ABEX DEFINITIONS - Preferred Definitions: - MI = Fe (preferably), Co, Ni, Mn,
 Cu, V, Sn, Ti, and/or Cr; - MII = Mg, Ca or Zn (preferably), Sr, Pb, Cd,
 Sn, Ba, and/or Be; - $y = 0.1$.
 EXAMPLE - Iron (III) phosphate (150.82 g), lithium carbonate
 (36.95 g), and carbon (12.0 g, 100% excess) were pre-mixed. The mixture
 was pelletized and heated to 750 degreesC at 2degrees/min in
 argon for 8 hours. The single phase olivine phosphate (LiFePO_4)
 produced was cooled to room temperature at 2 degrees/minute under argon.

The pellet formed was then powdered.

L134 ANSWER 15 OF 17 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
 AN 2001-478009 [52] WPIX Full-text
 DNC C2001-143539 [52]
 DNN N2001-353790 [52]
 TI Lithium secondary battery anode comprises conductive fine particles carried on lithium phosphate material powder
 DC L03; X16
 IN SAKURAI Y; TAKAHASHI M; TAKEI K; TOBISHIMA S
 PA (NITE-C) NIPPON TELEGRAPH & TELEPHONE CORP
 CYC 1
 PIA JP 2001110414 A 20010420 (200152)* JA 7[5] <--
 ADT JP 2001110414 A JP 1999-282445 19991004
 PRAI JP 1999-282445 19991004
 AB JP 2001110414 A UPAB: 20060117
 NOVELTY - Conductive fine particles (2) having an oxidation reduction potential greater than that of a lithium secondary anode active material of a lithium phosphate material is carried on lithium phosphate material powder (1) of olivine structure.
 DETAILED DESCRIPTION - Conductive fine particles (2) having an oxidation reduction potential greater than that of a lithium secondary anode active material of a lithium phosphate material is carried on lithium phosphate material powder (1) of olivine structure of formula $\text{Li}_2\text{Fe}_{1-x}\text{yX}_y\text{PO}_4$, where: 0 at most y at most 0.3; 0 at most z at most 1; and X is at least one of magnesium, cobalt, nickel and/or zinc.
 ADVANTAGE - Charge discharge capacity is high, and even when the charge discharge current is increased, the decrease of charge discharge capacity is reduced.
 DESCRIPTION OF DRAWINGS - This drawing shows an enlarged view of an anode. Lithium phosphate material powder (1) Conductive fine particle (2)
 TECH
 ELECTRONICS - Preferred Particles: The conductive fine particles are selected from one or more of silver, carbon, platinum, palladium, gold, iridium, aluminum, titanium and/or tantalum.
 L134 ANSWER 16 OF 17 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
 AN 2000-666463 [65] WPIX Full-text
 DNC C2000-202027 [65]
 DNN N2000-493969 [65]
 TI Composite electrode, especially for a high temperature polymer electrolyte lithium cell or an ambient temperature high voltage lithium ion cell, has a porous vitreous mineral solid electrolyte network containing a polymer solid electrolyte
 DC A85; L03; X16
 IN ANDRE B; ARMAND M; BELANGER A; BESNER S; DUPUIS E; GAUTHIER M; MAGNAN J;
 MAGNAN J F
 PA (HYDR-N) HYDRO-QUEBEC
 CYC 28
 PIA EP 1043787 A2 20001011 (200065)* FR 21[6] <--
 CA 2268316 A1 20001007 (200065) FR <--
 JP 2000348711 A 20001215 (200104) JA 62 <--
 US 6451487 B1 20020917 (200264) EN
 CA 2268316 C 20030923 (200369) FR
 ADT EP 1043787 A2 EP 2000-420064 20000404; CA 2268316 A1 CA 1999-2268316 19990407; CA 2268316 C CA 1999-2268316 19990407; JP 2000348711 A JP 2000-106151 20000407; US 6451487 B1 US 2000-545094 20000407
 PRAI CA 1999-2268316 19990407
 AB EP 1043787 A2 UPAB: 20050412

NOVELTY - A composite electrochemical cell electrode, comprising a coating of a porous vitreous mineral solid electrolyte network containing an organic polymer solid electrolyte, is new.

DETAILED DESCRIPTION - A composite electrochemical cell electrode comprises a current collector, dispersed electrochemically active material particles, optionally a first electronic conduction additive, a (partially) vitreous mineral solid electrolyte and a solid organic polymer electrolyte. The mineral electrolyte wets the surfaces of the active material, the conduction additive and the current collector to form a porous mineral network so that the wetted surface portions are protected by a sealing mineral phase. The polymer electrolyte is in intimate contact with the network to ensure ion exchange within the composite electrode and with the other components of the cell and also acts as a deformable binder for the assembly of the composite electrode, its collector and the cell electrolyte separator, the polymer electrolyte optionally containing a dispersed second electronic conduction additive for optimizing electron exchange within the composite electrode and its collector. The composite electrode is thus provided with exchange surface zones which are inaccessible to the polymer electrolyte components and to contaminants from other cell components and which are thus less susceptible to passivating film formation or to degradation, so that high quality electrical contacts are ensured within the composite electrode in spite of difficult temperature, voltage or cycling conditions. INDEPENDENT CLAIMS are also included for the following: (i) an electrochemical cell comprising an electrolyte separator between the above composite electrode and a second electrode, the separator comprising a solid polymer electrolyte, a combination of a polymer, an aprotic solvent and a dissociated lithium salt or a powder bonded by a (partially) vitreous mineral type electrolyte impregnated with a liquid or polymeric electrolyte; (ii) preparation of the above composite electrode by dispersing electrode material particles in an aqueous solution of the first electrolyte or its precursor, applying the resulting dispersion onto a current collector, drying and optionally applying a dispersion of a second electronic conduction additive in an organic polymer electrolyte containing a lithium salt onto the resulting porous mineral network film; and (iii) production of a half cell by carrying out the above process (ii), applying a dispersion of a mineral powder in another aqueous solution of the mineral electrolyte or its precursor to form a half cell comprising the collector, the composite mineral network and a porous mineral separator and then applying a polymer electrolyte containing a lithium salt onto the porous half cell.

USE - Especially in high temperature (40-125degreesC) lithium batteries containing polymer electrolytes or in ambient temperature high voltage (at least 4 V) lithium ion batteries.

ADVANTAGE - The composite electrode combines the advantages of a mineral solid electrolyte with those of a polymeric solid electrolyte, has exchange surface zones which are inaccessible to the polymer electrolyte components and to contaminants from other cell components and which are thus less susceptible to passivating film formation and corrosion at contact surfaces, so that high quality electrical contacts are ensured within the composite electrode under difficult temperature, high voltage and long term use conditions.

Additionally, the electrode has increased conductivity and can deform to accommodate volume changes during cycling. DESCRIPTION OF DRAWINGS - The drawing shows a composite electrode according to the invention.

TECH

ELECTRICAL POWER AND ENERGY - Preferred Materials: The first electronic conduction additive is selected from carbon black, graphite, metal powders, doped conjugated polymers and semi-metallic compounds based on (transition) metal carbides, nitrides, borides or silicides. The second electronic conduction additive is a carbon black or graphite. The electrode is a cathode comprising an active material selected from oxides, chalcogenides and oxyanion derivatives of transition metals and lithium.

Alternatively, the electrode is an anode with an active material having a potential of less than 1.6 V relative to that of metallic lithium. The current collector consists of aluminum or copper.

INORGANIC CHEMISTRY - Preferred Materials: The mineral electrolyte comprises one or more (partially) vitreous alkali metal (especially lithium or potassium) phosphates, polyphosphates, borates and/or polyborates, especially a lithium phosphate of close to LiPO_3 stoichiometry which has a pH of 4-9 and a conductivity of not less than 10-10 S/cm at the cell operating temperature and which is prepared by rapid neutralization of an aqueous metaphosphoric acid solution with a lithium salt. The mineral electrolyte may contain glass-formers selected from (partially) hydrolyzed organometallic titanates, aluminates, siloxanes and silicas. When the electrode is a cathode, the active material is especially based on vanadium oxide, phosphates or phosphosulfates of olivine structure of transition metals comprising iron or manganese or NASICONs , particularly of LiFePO_4 type in the discharged state.

POLYMERS - Preferred Materials: The first electronic conduction additive may be a doped conjugated polymer. The polymer electrolyte may comprise a gel of a polyelectrolyte, a polyether (containing ethylene oxide groups) or a non-solvating polymer matrix, a liquid aprotic solvent and a soluble salt (especially a lithium salt). **Preferred Process:** The polymer electrolyte may be introduced into the porous mineral network as a melt, a solution or as a low weight monomer or pre-polymer which is subsequently cross-linked or polymerized.

ABEX EXAMPLE - An aqueous solution of a vitreous mineral solid electrolyte of formula $(\text{LiPO}_3)_n$ was prepared by dissolving 75 g $(\text{HPO}_3)_n$ in 325 g water and neutralizing by adding 39.6 g $\text{LiOH} \cdot \text{H}_2\text{O}$ corresponding to a $(\text{HPO}_3)_n/\text{LiOH}$ molar ratio of 1. The solution was applied to an aluminum collector and vacuum dried at 150degreesC to obtain a 2 mu thick coating. The resulting sheet was covered, by hot transfer, with a 15 mu thick film of an ethylene oxide-based polymer electrolyte containing the lithium salt LiTFSI at a concentration corresponding to an O/Li molar ratio of 30/1. The system was mounted, by hot transfer, onto the face of a lithium anode and placed in a 4 cm² electrochemical cell. The resistive component of the vitreous solid electrolyte was about 10-9 S/cm at 25degreesC, showing that the $(\text{LiPO}_3)_n$ coating allowed lithium ion transport over short distances.

L134 ANSWER 17 OF 17 WPIX COPYRIGHT 2009

THOMSON REUTERS on STN

AN 1996-441832 [44] WPIX Full-text

CR 1994-324573

DNC C1996-139091 [44]

TI Upgrading hydrocarbon feedstock - by partially oxidising in the presence of a vanadium containing NASICON material

DC A41; E19; J04

IN AGASKAR P A; GRASSELLI R K

PA (AGAS-I) AGASKAR P A; (GRAS-I) GRASSELLI R K

CYC 1

PIA US 5550308 A 19960827 (199644)* EN 7[2]

<--

ADT US 5550308 A Div Ex US 1993-50794 19930422; US 5550308 A US 1994-312580 19940327

FDT US 5550308 A Div ex US 5354722 A

PRAI US 1994-312580 19940927

US 1993-50794 19930422

AB US 5550308 A UPAB: 20060112

Upgrading hydrocarbon feedstock comprises partially oxidising in the presence of a compsn. of formula (I) or (II): $\text{AxBl-xVyCl-yP3O10-15}$ (I), $\text{MzAxBl-xVyCl-yP3-nSinO10-15}$ (II). A = Nb or Ta; B = Sb or As; C = Ti; Zr; Sn or Ge; $0 \leq x \leq 1$; $0 \leq y \leq 1$; M = Cu, Ag, Bi, Na, K, Rb, or Cs; $0 \leq x, z \leq 1$; $0 \leq n \leq 2$. Pref.

the compsn. has a specified X-ray diffraction pattern and has opt. been heated to at least 700 °C, pref. at least 800 °C, especially at least 900 °C.
 USE - The material promotes partial oxidation reactions such as the reaction of n-C4 to form products less deeply oxidised than CO and CO2, such as maleic anhydride, furan and butadiene at less than 400 °C. The material also catalyses the reaction of alkyl aromatics e.g. o-xylene to aromatic oxygenates e.g. phthalic anhydride, which can be used to prepare alkyl, amino, and epoxy resins, as a flame retardant, rubber retarded or as an ester for plasticisers and polyesters.

=> d 1135 bib ab tech abex tot

L135 ANSWER 1 OF 22 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
 AN 2008-KJ2057 [62] WPIX Full-text
 DNC C2008-284080 [62]
 DNN N2008-752353 [62]
 TI Process for preparation of olivine lithium nickel phosphate composite
 DC E31
 IN ANGAIAH S; ARIYANAN M; RAMAIYER G; THIAGARAJAN V
 PA (COUN-N) COUNCIL SCI & IND RES INDIA
 CYC 1
 PIA IN 2001DE00481 I1 20080620 (200862)* EN [0]
 ADT IN 2001DE00481 I1 IN 2001-DE481 20010412
 PRAI IN 2001-DE481 20010412
 AB IN 200100481 I1 UPAB: 20080930
 NOVELTY - The preparation of olivine lithium nickel phosphate composite which is very useful for high voltage lithium reversible cells. The prepared product was subjected to x-ray analysis. The product was found to be in single phase. Olivine lithium nickel phosphate composite is prepared by mixing oxides of nickel, phosphorous with lithium carbonate and heating together all in solid state condition. Image 0/0

L135 ANSWER 2 OF 22 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
 AN 2005-590703 [60] WPIX Full-text
 CR 2005-486114; 2008-H27843
 DNC C2005-178051 [60]
 DNN N2005-484579 [60]
 TI Metallic negative electrode for use in battery cell, includes chemical protective layer of alkali metal phosphate on alkali metal layer surface, and physical protective layer of glass ionically conductive to ions of the alkali metal
 DC I03; P42; X16
 IN DE JONGHE L; NIMON Y S; SUKESHINI A M; VISCO S J
 PA (POLY-N) POLYPLUS BATTERY CO
 CYC 1
 PIA US 20050186469 A1 20050825 (200560)* EN 16[6]
 ADT US 20050186469 A1 Provisional US 2001-342326F 20011221; US 20050186469 A1 Cont of US 2002-327682 20021220; US 20050186469 A1 US 2005-92781 20050328
 FDT US 20050186469 A1 Cont of US 6911280 B
 PRAI US 2005-92781 20050328
 US 2001-342326F 20011221
 US 2002-327682 20021220
 AB US 20050186469 A1 UPAB: 20051223

NOVELTY - Metallic negative electrode (10) comprises an alkali metal layer (16) having a first surface (22a), a chemical protective layer (18) coating the first surface, and a physical protective layer adjacent to the chemical protective layer. The chemical protective layer comprises an alkali metal phosphate. The physical protective layer comprises a glass ionically conductive to ions of the alkali metal.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for: (a) method of providing a chemical protective layer on a metal comprising introducing an alkali metal into a reaction chamber, introducing organic phosphate precursor(s) of the protective layer into the reaction chamber and into contact with a first surface of the metal, and conducting a reaction involving the precursors to form an alkali metal phosphate chemical protective layer on the metal; and (b) battery cell comprising the negative electrode, a positive electrode, an electrolyte, and current collectors. The positive electrode is a sulfur-based positive electrode, a metal oxide based positive electrode, and a metal sulfide based positive electrode. The electrolyte disposed between the negative and positive electrodes. The current collectors are on the negative and positive electrodes.

USE - For use in battery cell (claimed).

ADVANTAGE - The inventive negative electrode is capable of alleviating the problem of reaction of lithium or other alkali or alkaline earth metals with incompatible processing and operating environments by creating the ionically conductive chemical protective layer on the lithium or other reactive metal surface. The chemically produced surface layer protects lithium metal from reacting with oxygen, nitrogen or moisture in ambient atmosphere thus allowing the lithium material to be handled outside of a controlled atmosphere, e.g. dry room. The negative electrode is made using a simple production process.

DESCRIPTION OF DRAWINGS - The figure is a block diagram of a lithium/liquid electrolyte/sulfur cell. Negative electrode (10)

Metal layer (16)

Chemical protective layer (18) Metal layer first surface (22a) Metal layer second surface (22b)

TECH

CERAMICS AND GLASS - Preferred Component: The ionically conductive glass comprises phosphorus-based glass, oxide-based glass, sulfur-based glass, oxide/sulfide based glass, selenide-based glass, gallium based glass, germanium-based glass, and glass-ceramic active metal ion conductors, sodium beta-alumina, or lithium beta-alumina. The ionically conductive glass comprises Li_3PO_4 , $\text{Li}_2\text{S} \cdot \text{SiS}_2$, $\text{Li}_2\text{S} \cdot \text{GeS}_2 \cdot \text{Ga}_2\text{S}_3$, and $\text{Li}_{1-x}\text{-yAl}_x\text{Ti}_2\text{-xSi}_y\text{P}_3\text{-yO}_{12}$, LISICON (sic), NASICON (sic), sodium and lithium beta-alumina, or preferably lithium phosphorus oxynitride (LiPON).

ELECTRICAL POWER AND ENERGY - Preferred Component: The electrode includes an electronically conductive current collector contacting a second surface (22b) of the metal layer, and a polymer electrolyte disposed on the protective layer. The second surface of the metal layer is opposite to the first surface of the metal layer.

Preferred Parameter: The chemical protective layer is 10 nm to 1 micron or 50 nm to 0.1 micron thick.

Preferred Method: The method includes bonding an electronically conductive backing on a second surface of the metal layer. It includes forming and placing in a battery cell package an electrochemical structure comprising a negative electrode comprising an alkali metal, a positive electrode, a separator disposed between the negative and positive electrodes, and current collectors on the negative and positive electrodes; introducing a liquid electrolyte or catholyte comprising the phosphate precursors into the battery cell package and into contact with an exposed surface of the negative metal electrode; and forming the chemical protective layer on the exposed surface of the negative metal electrode. The metal forms part of a negative electrode.

INORGANIC CHEMISTRY - Preferred Material: The metal layer comprises an alkali metal of sodium (Na), potassium (K), or preferably lithium (Li). The current collector is copper. The protective layer is lithium phosphate. The precursor is anhydrous phosphoric acid in an organic solvent.

METALLURGY - Preferred Material: The metal layer may comprise alloys of Na, K, or preferably Li.

ORGANIC CHEMISTRY - Preferred Material: The metal layer comprises an alkali metal of sodium (Na), potassium (K), or preferably lithium (Li). The current collector is copper. The protective layer is lithium phosphate. The precursor is anhydrous phosphoric acid in an organic solvent.

ORGANIC CHEMISTRY - Preferred Material: The organic solvent is dimethoxyethane (DME), mono-, di- and tri-glymes, ether, or tetrahydrofuran (THF).

ABEX EXAMPLE - The Li electrode surface was treated with dry DME containing anhydrous phosphoric acid (1500 ppm) for 45 seconds. Surface treatment was conducted by coating of the Li foil pressed with this solution followed by DME evaporation. After Li reaction with phosphoric acid and formation of lithium phosphate layer on the Li surface, DME was allowed to evaporate at room temperature. Residual unreacted phosphoric acid on the surface was rinsed out by a large volume of DME. Electrochemical cells containing a Li electrode coated with a lithium phosphate chemical protective under layer were assembled and tested. The impedance of the interface between the Li electrode and a solution of 0.5 M LiTFSI (sic) in the mixture of DME and 1,3-Dioxolane (9:1) was measured after different storage periods. The electrode pretreated with phosphoric acid exhibited relatively small and stable impedance and at the same time the interface impedance for cells having an untreated Li electrode grew rapidly during storage. Evaluation results had indicated that the formed lithium phosphate surface layer can protect the Li electrode from reacting with the active components of the electrolyte.

L135 ANSWER 3 OF 22 WPIX COPYRIGHT 2009

THOMSON REUTERS on STN

AN 2005-486114 [49] WPIX [Full-text](#)

CR 2005-590703; 2008-H27843

DNC C2005-148218 [49]

DNN N2005-395600 [49]

TI Stand-alone metallic cathode for use in electrochemical device, e.g. battery, comprises alkali metal layer, and chemical protective layer of alkali or alkaline earth metal carbonate coating first surface of metal layer

DC L03; X16

IN DE JONGHE L; NIMON Y S; SUKESHINI A M; VISCO S J

PA (POLY-N) POLYPLUS BATTERY CO

CYC 1

PIA US 6911280 B1 20050628 (200549)* EN 16[6]

ADT US 6911280 B1 Provisional US 2001-342326P 20011221; US 6911280

B1 US 2002-327682 20021220

PRAI US 2002-327682 20021220

US 2001-342326P 20011221

AB US 6911280 B1 UPAB: 20051223

NOVELTY - Stand-alone metallic negative electrode comprises an alkali metal layer (16) having a first surface (22b), and a chemical protective layer (18) coating the first surface. The protective layer comprises alkali or alkaline earth metal carbonate.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for: (a) a method of providing a chemical protective layer on metal forming part of negative electrode, by introducing alkali metal into a reaction chamber; introducing precursor(s) of protective layer into the reaction chamber and into contact

with a first surface of metal; and conducting a reaction involving the precursor to form the chemical protective layer on metal; and
 (b) a battery cell comprising a negative metal electrode comprising an alkali metal and a protective layer on an electrolyte exposed surface; a positive electrode, e.g. sulfur-based anode, metal-oxide-based positive electrode, or metal-sulfide-based anode; an electrolyte between the negative and positive electrodes; and current collectors on the electrodes.

USE - For use in electrochemical device, e.g. battery or capacitor.

ADVANTAGE - The provision of chemical protective layer on metal surface alleviates the problem of reaction of lithium or other alkali or alkaline earth metals with incompatible processing and operating environments. The protective layer can protect lithium metal from reacting with oxygen, nitrogen, or moisture in ambient atmosphere, allowing lithium material to be handled outside of a controlled atmosphere e.g. dry atmosphere.

DESCRIPTION OF DRAWINGS - The figure shows the cathode. Backing (14)
 Metal layer (16)

Chemical protective layer (18) First and second surfaces of backing (20a, 20b)
 Second and first surfaces of metal layer (22a, 22b) First and second surfaces of protective layer (24a, 24b)

TECH

ELECTRICAL POWER AND ENERGY - Preferred Components: The electrode includes an electronically conductive backing (14) intimately contacting a second surface (22a) of metal layer, a layer of solid electrolyte intimately contacting the surface of protective layer on the metal layer. The backing is copper current collector. Preferred Dimensions: The protective layer has a thickness of 1 nm - 10 microns, preferably 50 nm - 0.1 microns.

INORGANIC CHEMISTRY - Preferred Materials: The metal layer comprises alkali metal, e.g. sodium, potassium, or preferably lithium or lithium alloy. The protective layer comprises alkali metal carbonate, preferably lithium carbonate. The solid electrolyte is inorganic solid electrolyte, preferably ionically conductive glass comprising phosphorus-based glass, oxide-based glass, sulfur-based glass, oxide/sulfide-based glass, selenide-based glass, gallium-based glass, germanium-based glass, or glass-ceramic active metal ion conductor; sodium beta-alumina; and lithium beta-alumina. The ionically conductive glass comprises lithium-phosphorus oxynitride (LiPON), Li₃PO₄.Li₂S.SiS₂, Li₂S.GeS₂.Ga₂Se₃, or Li_{1-x}YAlxTi₂-xSi_yP_{3-y}O₁₂; LISICON; NASICON; and sodium and lithium beta-alumina.

ORGANIC CHEMISTRY - Preferred Materials: The metal layer comprises alkali metal, e.g. sodium, potassium, or preferably lithium or lithium alloy. The protective layer comprises alkali metal carbonate, preferably lithium carbonate. The solid electrolyte is inorganic solid electrolyte, preferably ionically conductive glass comprising phosphorus-based glass, oxide-based glass, sulfur-based glass, oxide/sulfide-based glass, selenide-based glass, gallium-based glass, germanium-based glass, or glass-ceramic active metal ion conductor; sodium beta-alumina; and lithium beta-alumina. The ionically conductive glass comprises lithium-phosphorus oxynitride (LiPON), Li₃PO₄.Li₂S.SiS₂, Li₂S.GeS₂.Ga₂Se₃, or Li_{1-x}YAlxTi₂-xSi_yP_{3-y}O₁₂; LISICON; NASICON; and sodium and lithium beta-alumina.

ORGANIC CHEMISTRY - Preferred Materials: The precursor is in the gas phase or liquid phase. The precursor comprises gaseous carbon dioxide (CO₂), a mixture of CO₂ and oxygen (O₂), or liquid organic carbonate such as propylene carbonate, ethylene carbonate, dimethyl carbonate, diethyl carbonate, or ethyl methyl carbonate.

POLYMERS - Preferred Materials: The solid electrolyte is solid polymer electrolyte.

DNC C2004-118671 [29]
 TI Positive electrode active material for lithium secondary battery
 DC L03; X16
 IN CHUNG H S; JUNG H S; KIM G B; PARK Y C
 PA (SMSU-C) SAMSUNG SDI CO LTD
 CYC 1
 PIA KR 2003091581 A 20031203 (200429)* KO [0]
 KR 441520 B 20040723 (200474) KO
 ADT KR 2003091581 A KR 2002-29675 20020528; KR 441520 B KR
 2002-29675 20020528
 FDT KR 441520 B Previous Publ KR 2003091581 A
 PRAI KR 2002-29675 20020528
 AB KR 2003091581 A UPAB: 20050528
 NOVELTY - A positive electrode active material for a lithium secondary battery and its preparation method are provided, to improve electrochemical properties and thermal stability.
 DETAILED DESCRIPTION - The positive electrode active material comprises a lithium intercalation compound; and a surface treatment layer containing the compound represented by MXOk formed on the surface of the lithium intercalation compound, in which M is at least one element selected from the group consisting of an alkali metal, an alkaline earth metal, an element of group 13 and 14, a transition metal and a rare earth metal; X is an element capable of forming a double bond together with oxygen; k is 2-4; and the compound represented by MXOk has an olivine structure. Preferably X is selected from the group consisting of P, S and W. Preferably the surface treatment layer has a thickness of 0.01-2 micrometers.
 ADVANTAGE - Electrochemical properties and thermal stability are improved.

L135 ANSWER 5 OF 22 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
 AN 2004-210945 [20] WPIX Full-text
 DNC C2004-083620 [20]
 TI Cathode material of battery and preparation method thereof
 DC E19; L03; X16
 IN BAE J S; KIM J O; KWON Y H; LEE G Y; LEE Y H; PARK H G; PARK S Y
 PA (GLDS-C) LG CHEM LTD
 CYC 1
 PIA KR 2003040870 A 20030523 (200420)* KO [0]
 KR 404894 B 20031107 (200420) KO
 ADT KR 2003040870 A KR 2001-71460 20011116; KR 404894 B KR
 2001-71460 20011116
 FDT KR 404894 B Previous Publ KR 2003040870 A
 PRAI KR 2001-71460 20011116
 AB KR 2003040870 A UPAB: 20050528
 NOVELTY - A lithium metal composite oxide used as the cathode material of a battery, its preparation method and a lithium or lithium ion secondary battery employing the lithium metal composite oxide as a cathode active material are provided, to improve the storage property and the lifetime at a high temperature as well as at a room temperature.
 DETAILED DESCRIPTION - The lithium metal composite oxide is the surface-treated lithium metal composite oxide comprising a lithium metal composite oxide core; and a fluorine-based organic metal salt coating layer. Preferably the lithium metal composite oxide is the layered compound represented by $Li(L(1-x)XxO_2)$, the spinel-type compound represented by $LiMn_2O_4$, an olivine structured compound represented by $Li_2P_2O_4$, and the layered compound represented by $Li(NiMnBZc)O_2$, wherein L is Ni or Co; X is Al, B, Sn, Ti, Zr, Si, Co or Ni; 0at mostxat most0.5; Y is Co, Fe or Mn; Z is Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Zr, Nb, Y, Sn, Al, Si or In; 0.2at mostaat most 0.8; 0.2at mostbat most0.8; and 0at mostcat most0.3. Preferably the fluorine-based organic metal salt is represented by the formula (F)x(CO2)yAM or (F)x(SO3)yAM,

wherein F is a fluorine-based organic compound containing CF₃; A is N or C; M is Li, Na, K, Mg, Ca, Sr, Ba, B, Al, Si, Y, Ti, Sn or a compound containing the metal; and x and y are an integer of 1-5, respectively.

L135 ANSWER 6 OF 22 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
 AN 2004-038272 [04] WPIX [Full-text](#)
 DNC C2004-015362 [04]
 DNN N2004-031187 [04]
 TI Manufacturing of olivine mold, involves mixing iron and manganese oxide complex formed with phosphoric acid and lithium
 DC E31; L03; X16
 IN HAYASHI T; KAMATA T; NUMATA K; TODOROV J M
 PA (MITG-C) MITSUI MINING & SMELTING CO LTD
 CYC 1
 PIA JP 2003257429 A 20030912 (200404)* JA 8[1]
 ADT JP 2003257429 A JP 2002-57134 20020304
 PRAI JP 2002-57134 20020304
 AB JP 2003257429 A UPAB: 20050527
 NOVELTY - Manufacturing of olivine mold involves mixing iron and manganese oxide complex with phosphoric acid and lithium. The complex is formed by co-precipitating iron and manganese. 15-45 mol% of iron is contained with respect to manganese.
 DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for the following:
 (1) the positive electrode active material for non-aqueous electrolyte secondary batteries; and (2) non-aqueous electrolyte secondary battery.
 USE - As positive electrode active material for non-aqueous electrolyte secondary batteries and as non-aqueous electrolyte secondary battery (claimed).
 ADVANTAGE - The non-aqueous electrolyte secondary battery has high energy density and olivine mold is inexpensive.

L135 ANSWER 7 OF 22 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
 AN 2003-701710 [67] WPIX [Full-text](#)
 DNC C2003-194071 [67]
 DNN N2003-560425 [67]
 TI Non-aqueous electrolyte battery comprises anode containing fluorine substituted olivine-type lithium phosphate as anode active material, cathode and non-aqueous electrolyte
 DC L03; X16
 IN IMACHI N; NAKANE I; UBUKAWA S
 PA (SAOL-C) SANYO ELECTRIC CO LTD
 CYC 1
 PIA JP 2003187799 A 20030704 (200367)* JA 9[4]
 JP 3631202 B2 20050323 (200522) JA 14
 ADT JP 2003187799 A JP 2001-389525 20011221; JP 3631202 B2 JP 2001-389525 20011221
 FDT JP 3631202 B2 Previous Publ JP 2003187799 A
 PRAI JP 2001-389525 20011221
 AB JP 2003187799 A UPAB: 20060120
 NOVELTY - A non-aqueous electrolyte battery comprises an anode (5) containing an anode active material, a cathode (6) and a non-aqueous electrolyte. The anode active material is a fluorine substituted olivine-type lithium phosphate.
 DETAILED DESCRIPTION - A non-aqueous electrolyte battery comprises an anode containing an anode active material, a cathode and a non-aqueous electrolyte. The anode active material is a fluorine substituted olivine-type lithium phosphate of formula LiMPO₄, where M is cobalt, nickel, manganese and/or iron.
 USE - Used as a non-aqueous electrolyte battery.

ADVANTAGE - The non-aqueous electrolyte battery as highly efficient discharge characteristic by reducing electrical resistance of the anode active material, and improved electroconductivity. DESCRIPTION OF DRAWINGS - The figure shows the perspective view of the electrode used in non-aqueous electrolyte battery.

Anode (5)
Cathode (6)

TECH

INORGANIC CHEMISTRY - Preferred Compound: The olivine-type lithium phosphate is $\text{LiM}(\text{PO}_4)_{1-x}(\text{SO}_4)_x$, which is obtained by substituting a phosphate group of LiMPO_4 , by a sulfate group and where 0 less than x at most 0.3.
Preferred Composition: The amount of fluorine in the fluorine substituted olivine-type lithium phosphate is 2 mass% or less.

ABEX EXAMPLE - Lithium carbonate (in mass%) (0.5), cobalt oxide (1) and diphosphorus pentaoxide (0.5) were mixed and olivine-type lithium phosphate (LiCoPO_4) was produced. Fluorinated lithium (2) was added to the olivine-type lithium phosphate, bake-processed at 60 degrees C for 15 hours and a portion of the olivine-type lithium phosphate substituted with fluorine was obtained, which is an anode active material. Carbon and graphite were mixed in the ratio of 90:5 to the active material, compressed and a mixed anode active material was obtained. N-methyl pyrrolidone solvent was then added to the active material. The active material slurry was coated on both surfaces of an aluminum foil, dried and an anode was obtained. The anode had an electrical conductivity of 1.9×10^{-7} S/cm and a discharge capacitance of 106.8 mAh/g. Similarly a cathode was produced and arranged in a battery case to form a non-aqueous electrolyte battery.

L135 ANSWER 8 OF 22 WPIX COPYRIGHT 2009

THOMSON REUTERS on STN

AN 2003-592078 [56] WPIX [Full-text](#)

DNC C2003-160891 [56]

DNN N2003-471511 [56]

TI Non-aqueous electrolyte battery has positive electrode made of olivine-type lithium phosphate with carbon particles

DC L03; X16

IN IMACHI N; NAKANE I; UBUKAWA S

PA (SAOL-C) SANYO ELECTRIC CO LTD

CYC 1

PIA JP 2003203628 A 20030718 (200356)* JA 9[5]

ADT JP 2003203628 A JP 2001-401699 20011228

PRAI JP 2001-401699 20011228

AB JP 2003203628 A UPAB: 20050531

NOVELTY - The battery has a positive electrode made of an olivine -type lithium phosphate having metals chosen from cobalt (Co), nickel (Ni), manganese (Mn) and iron (Fe) and a negative electrode with a non-aqueous electrolyte. The olivine-type lithium phosphate consists of carbon particles. USE - Non-aqueous electrolyte battery.

ADVANTAGE - Provides a non-aqueous electrolyte battery with high rate discharge property and high capacity. The electrical resistance of the positive electrode is reduced, and the electroconductivity of the battery is increased.

DESCRIPTION OF DRAWINGS - The figure shows a cross-sectional view of the olivine-type lithium phosphate particles. (Drawing includes non-English language text).

L135 ANSWER 9 OF 22 WPIX COPYRIGHT 2009

THOMSON REUTERS on STN

AN 2003-091264 [08] WPIX [Full-text](#)

DNC C2003-022981 [08]

TI Production of olivine lithium nickel phosphate composite for lithium reversible cells, involves calcining paste obtained by adding glycerol to uniform mixture of lithium carbonate and oxides of nickel and phosphorus

DC E36; L03

IN ANGAIAS S; ARIYANAN M; RAMAIYER G; THIAGARAJAN V

PA (COUL-C) COUNCIL SCI & IND RES; (COUL-C) CSIR COUNCIL SCI IND RES

CYC 2

PIA US 20020141928 A1 20021003 (200308)* EN 5[1]
 JP 2002293517 A 20021009 (200308)# JA 3
 US 6485699 B2 20021126 (200308) EN
 JP 3993394 B2 20071017 (200770)# JA 4

ADT US 20020141928 A1 US 2001-820275 20010328; JP 2002293517 A
 JP 2001-98280 20010330; US 6485699 B2 US 2001-820275
 20010328; JP 3993394 B2 JP 2001-98280 20010330

FDT JP 3993394 B2 Previous Publ JP 2002293517 A

PRAT US 2001-820275 20010328
 JP 2001-98280 20010330

AB US 20020141928 A1 UPAB: 20050528
 NOVELTY - Production of olivine lithium nickel phosphate composite involves uniformly mixing oxides of nickel and phosphorus with lithium carbonate, converting the resulting mixture to a paste by adding glycerol, and calcining the paste at up to 800 degrees C continuously for up to 12 hours.
 USE - The olivine lithium nickel phosphate composite is used as a reversible cathode material useful in high voltage lithium reversible cells.
 ADVANTAGE - Fine particles of reactants such as lithium carbonate, nickel oxide and phosphorus pentoxide are bound by glycerol and a uniform paste of the required consistency is obtained. The paste is calcined to obtain high quality lithium nickel phosphate in a single phase component free from impurities. Addition of glycerol as a binder has no influence in the formation of the final product, and no unreacted reactants are left.

TECH INORGANIC CHEMISTRY - Preferred Process: Calcination is performed in a furnace, and urea is used as a flux.

ABEX SPECIFIC COMPOUNDS - The oxide of phosphorus is phosphorus pentoxide, and the nickel oxide is nickel monoxide.
 EXAMPLE - Lithium carbonate (0.74 g), nickel monoxide (1.49 g) and phosphorus pentoxide (1.42 g) were mixed slowly in glycerol binder (2 ml), in a molar ratio of 1:1:1. Urea as flux (2.402 g) was added slowly while heating up to 800 degrees C for 10 hours. The mixture was then cooled to room temperature and the residue was subjected to X-ray diffraction exposure. The purple colored product confirmed the production of olivine lithium nickel phosphate composite. The efficiency of the reaction was 90%, and the product was obtained in single phase. The single electrode potential of lithium nickel phosphate with respect to nickel in 1 M lithium perchlorate in propylene carbonate was 2.99 V.

L135 ANSWER 10 OF 22 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN

AN 2002-695240 [75] WPIX Full-text

CR 2002-531692; 2002-534313; 2003-305266

DNN N2002-548602 [75]

TI Lithium secondary battery, useful in communication apparatus, having positive electrode, negative electrode, and aqueous electrolyte

DC X16

IN KANZAKI M; NAKANO H; SASAKI I; UKIYOU Y

PA (TOYW-C) TOYOTA CHUO KENKYUSHO KK

CYC 1

PIA JP 2002260722 A 20020913 (200275)* JA 10[4]

ADT JP 2002260722 A JP 2001-53831 20010228

PRAI JP 2001-53831 20010228
 AB JP 2002260722 A UPAB: 20050527

NOVELTY - A lithium secondary battery comprises a positive electrode where an olivine structure lithium iron composite oxide having a composition LiFePO_4 is contained in a positive electrode active material; a negative electrode where a material having a lithium absorbing and an elimination level lower than that of a lithium iron composite oxide forms a negative electrode active material; and aqueous electrolyte where lithium salt is dissolved in water.

USE - Useful in a communication apparatus and an information related apparatus.

ADVANTAGE - With high safety and a lost maintained, capacity is high and output characteristics are excellent. An olivine structure lithium iron oxide where a composition, being a typical composition of a lithium iron composite oxide, is LiFePO_4 is contained in a positive electrode active material of a lithium secondary battery.

L135 ANSWER 11 OF 22 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN

AN 2002-604637 [65] WPIX [Full-text](#)

DNC C2002-171089 [65]

DNN N2002-479665 [65]

TI Nonaqueous electrolytic secondary battery, useful in cordless electronic apparatuses, positive electrode active material having phosphate compound-contained positive electrode active material and conductive regulating material

DC L03; X16

IN NAKAMURA M; SAITO H

PA (NPDE-C) NIPPONDENSO CO LTD

CYC 1

PIA JP 2002216770 A 20020802 (200265)* JA 7[0]

ADT JP 2002216770 A JP 2001-13581 20010122

PRAI JP 2001-13581 20010122

AB JP 2002216770 A UPAB: 20060120

NOVELTY - In a nonaqueous electrolytic secondary battery having a positive electrode having a positive electrode active material capable of absorbing and discharging lithium ion, and a positive electrode capable of absorbing or discharging lithium ion, the positive electrode active material has a phosphate compound-containing positive electrode active material being of olivine structure containing at least Li and at least one of the positive electrode and the negative electrode has nature where conductivity is eminently changed by chemical doping period dedoping, and has a conductive regulation material to cut off a flowing to the nonaqueous electrolytic secondary battery due to reduction of the conductivity.

USE - Useful in cordless electronic apparatuses, such as video cameras and portable telephone sets.

ADVANTAGE - When abnormality occurs to a battery during charge and discharge, prompt reply to abnormality is practicable.

TECH

ELECTRONICS - A conductive regulation material is a material capable of effecting P type doping and contained in a positive electrode.

L135 ANSWER 12 OF 22 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN

AN 2002-321776 [36] WPIX [Full-text](#)

DNC C2002-093616 [36]

DNN N2002-252247 [36]

TI Lithium iron complex oxide used as anode active material of lithium secondary battery has preset mean particle diameter

DC E31; L03; X16

IN KANZAKI M; TAKEUCHI Y; UKIYOU Y

PA (TOYW-C) TOYOTA CHUO KENKYUSHO KK

CYC 1
 PIA JP 2002015735 A 20020118 (200236)* JA 9[6] <--
 ADT JP 2002015735 A JP 2000-195894 20000629
 PRAI JP 2000-195894 20000629
 AB JP 2002015735 A UPAB: 20050525
 NOVELTY - The lithium iron complex oxide having olivine structure with specific composition, has mean particle diameter of less than 1 μm . The lithium iron complex oxide is used as anode active material of lithium secondary battery.
 DETAILED DESCRIPTION - The lithium iron complex oxide having olivine structure with a basic composition of LiFePO_4 , has mean particle diameter of less than 1 μm . The lithium iron complex oxide is used as anode active material of lithium secondary battery. INDEPENDENT CLAIMS are also included for the following: (1) Manufacture of lithium iron complex oxide involves baking raw material containing mixture of lithium compound, iron compound and phosphorus containing ammonium salt, at 600-700degreesC; and (2) Lithium secondary battery comprising lithium iron complex oxide as anode active material.
 USE - As anode active material of lithium secondary battery.
 ADVANTAGE - The occlusion-desorption of lithium ion in anode is improved by using lithium iron complex oxide as anode active material. Lithium secondary battery with excellent cyclic characteristics and large discharge capacitance, is provided using lithium iron complex oxide as anode active material.
 DESCRIPTION OF DRAWINGS - The figure shows the X-ray diffraction pattern of lithium iron complex oxide. (Drawing includes non-English language text).

L135 ANSWER 13 OF 22 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
 AN 2002-068299 [10] WPIX Full-text
 DNC C2002-020579 [10]
 DNN N2002-050570 [10]
 TI Charging of nonaqueous electrolyte secondary battery involves maintaining anode in potential where nonaqueous solvents having reduction potential higher than that of the main solvent is reduced
 DC E13; L03; X16
 IN HARA T; HARATOMI T; KITA A; SHIBUTANI M; SHIBUYA M; SUZUKI Y; AKINORI K; MASHIO S; TOMITARO H; YUSUKE S
 PA (HARA-I) HARA T; (KITA-I) KITA A; (SHIB-I) SHIBUYA M; (SONY-C) SONY CORP; (SUZU-I) SUZUKI Y
 CYC 33
 PIA EP 1156548 A2 20011121 (200210)* EN 49[5] <--
 CA 2347630 A1 20011116 (200210) EN <--
 JP 2001325988 A 20011122 (200210) JA 20 <--
 CN 1323076 A 20011121 (200218) ZH <--
 US 20020034678 A1 20020321 (200224) EN <--
 KR 2002002200 A 20020109 (200246) KO <--
 US 6534957 B2 20030318 (200322) EN
 TW 496002 A 20020721 (200329) ZH
 MX 2001004839 A1 20041101 (200557) ES
 CN 1641924 A 20050720 (200575) ZH
 CN 1249844 C 20060405 (200661) ZH
 CN 1306648 C 20070321 (200751) ZH
 KR 782868 B1 20071206 (200843) KO
 ADT EP 1156548 A2 EP 2001-111562 20010511; JP 2001325988 A JP 2000-144042 20000516; TW 496002 A TW 2001-111219 20010511; MX 2001004839 A1 MX 2001-4839 20010514; CA 2347630 A1 CA 2001-2347630 20010515; CN 1323076 A CN 2001-122065 20010516; CN 1641924 A Div Ex CN 2001-122065 20010516; CN 1249844 C CN 2001-122065 20010516; KR 2002002200 A KR 2001-26695 20010516; US 20020034678 A1 US 2001-259058 20010516; US 6534957 B2 US 2001-859058 20010516; CN 1641924 A CN

2005-10004277 20010516; CN 1306648 C CN 2005-10004277
20010516; KR 782868 B1 KR 2001-26695 20010516

FDT KR 782868 B1 Previous Publ KR 2002002200 A

PRAI JP 2000-144012 20000516

AB EP 1156548 A2 UPAB: 20060202

NOVELTY - A nonaqueous electrolyte secondary battery is charged in at least two charging steps. The first step involves maintaining the anode in a potential where any of the nonaqueous solvents having a reduction potential higher than that of the main solvent is reduced, while the main solvent is not reduced nor decomposed.

DETAILED DESCRIPTION - A charging method for initially charging a nonaqueous electrolyte secondary battery comprising an anode, a cathode, and an electrolyte including several kinds of nonaqueous solvents, comprises a first charging step in which the potential of the anode is maintained in a potential where any of the nonaqueous solvents having a reduction potential higher than that of the main solvent is reduced, while the main solvent is not reduced nor decomposed. The nonaqueous solvents include a main solvent and one or more kinds of nonaqueous solvents having a reduction potential higher than that of the main solvent.

USE - For charging nonaqueous electrolyte secondary battery such as lithium-ion secondary battery.

ADVANTAGE - The invention improves initial charging and discharging efficiency of the battery, reduces the charge of wasteful materials, and improves high capacity and high cyclic characteristics of the battery without deteriorating various kinds of battery properties.

TECH

ELECTRICAL POWER AND ENERGY - Preferred Process: The second charging step is carried out so that the potential of the anode is lower than the potential of the first charging step. Assuming that the reduction potential of the nonaqueous solvent is higher than the reduction potential of the main solvent A, the reduction potential of a nonaqueous having the highest potential in the main solvent is B, and the potential of the anode is E, the first charging step is carried so that the value of E is between B and A. The first charging step is carried under a constant current or under a constant-current and constant voltage. The second charging step is carried out to satisfy a relation of E less than B. The initial charging step for preventing the elusion of copper is carried out before the first charging step. It is carried out until the battery voltage reaches 0.5-1.0 V.

Preferred Value: The charging current value in the first charging step is 10%C or lower. The value of the end voltage of a constant-current charge or the value of the constant-voltage of a constant-current and constant-voltage charge is set so that the potential of the anode is 0.7-3.0 V by using the potential of lithium metal as a reference to achieve a first charging process. The value of the end voltage or the value of the constant-voltage is 3.1-3.7 (preferably 2.5-2.9) V. A constant-current charge or a constant-current and constant voltage-voltage charge in which the value of end voltage or the value of constant-voltage exceeds the value of the end voltage or the value of the constant-voltage in the first charging step and is not higher than 4.4 V is carried out as a second charging step.

Preferred Component: The anode has current collector composed of copper. The electrolyte is a gel electrolyte or a solid electrolyte. The anode includes carbon as active material. The cathode active material is lithium cobalt carbon dioxide and lithium cobalt oxide obtained by replacing a part of cobalt. It may be lithium manganate, lithium nickel oxide or at least one kind of lithium oxide such as lithium oxide obtained by replacing a part of manganese or nickel. It may also be lithium iron (II) phosphate and olivine oxide obtained by replacing a

part of iron.

ORGANIC CHEMISTRY - Preferred Solvent: The nonaqueous solvent is vinylene carbonate and their derivatives. Ethylene carbonate and propylene carbonate are included as the main solvent.

Preferred Composition: The amount of vinylene carbonate and their derivatives contained in the nonaqueous solvent is 0.05-5 wt.% of all the nonaqueous solvents.

L135 ANSWER 14 OF 22 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
 AN 2001-650560 [75] WPIX Full-text
 DNC C2001-192136 [75]
 DNN N2001-486305 [75]
 TI Non-aqueous electrolyte lithium secondary battery has cathode active material containing lithium-titanium complex oxide of spinal structure and anode material containing lithium-metal phosphate of olivine structure
 DC L03; X16
 IN IGUCHI T; KURATOMI J; KUWANA K
 PA (YUAS-C) YUASA CORP KK
 CYC 1
 PIA JP 2001196061 A 20010719 (200175)* JA 6[1] <--
 ADT JP 2001196061 A JP 2000-6070 20000111
 PRAI JP 2000-6070 20000111
 AB JP 2001196061 A UPAB: 20050527
 NOVELTY - A non-aqueous electrolyte lithium secondary battery contains a cathode active material containing lithium-titanium complex oxide having a spinal structure, and an anode active material containing lithium-metal phosphate having an olivine structure.
 DETAILED DESCRIPTION - The non-aqueous electrolyte lithium secondary battery contains cathode active material containing $\text{Li}_x\text{Ti}_5/3\text{-yLyO}_4$ having a spinel structure (where L is an element except titanium, x is 4/3-7/3 and y is 0-5/3), and an anode active material containing LiMPO_4 having an olivine structure (where M is transition metal(s) and m is 0-2.).
 USE - As a lithium secondary battery.
 ADVANTAGE - The non-aqueous electrolyte lithium secondary battery has good durability, reduced self-discharge characteristics and high energy density. The lithium secondary battery is safe to use.

L135 ANSWER 15 OF 22 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
 AN 2001-445278 [48] WPIX Full-text
 DNC C2001-134820 [48]
 DNN N2001-329190 [48]
 TI lithium secondary battery, useful in portable telephone set, contains phosphoric compound, and material absorbing or storing lithium metal or lithium alloy forming positive electrode active material
 DC L03; X16
 IN SAKURAI Y; TAKAHASHI M; TAKEI K; TOBISHIMA S
 PA (NITE-C) NIPPON TELEGRAPH & TELEPHONE CORP
 CYC 1
 PIA JP 2001085010 A 20010330 (200148)* JA 8[6] <--
 JP 3504195 B2 20040308 (200418) JA 7
 ADT JP 2001085010 A JP 1999-261394 19990916; JP 3504195 B2 JP 1999-261394 19990916
 FDT JP 3504195 B2 Previous Publ JP 2001085010 A
 PRAI JP 1999-261394 19990916
 AB JP 2001085010 A UPAB: 20060117
 NOVELTY - This lithium secondary battery contains a phosphoric acid compound having olivine structure. An element X is a material being electrochemically

stable in a 3 - 4V potential region, based on the standard potential of a lithium metal, in a state to constitute the phosphoric acid compound. Further, this battery contains a material absorbing and discharging a lithium metal, a lithium alloy, or lithium ion, as a positive electrode active material.

Further, lithium ion contains a material, effecting movement to effect electric chemical reaction to the positive electrode active material and the negative electrode active material, as electrolyte.

DETAILED DESCRIPTION - The phosphoric acid compound has formula $\text{Li}_z\text{Fe}_{1-y}\text{X}_y\text{PO}_4$ where 0 less than z less than or equals 1 is satisfied, y is less than or equals 0.3.

USE - Used in a portable telephone set and a note type personal computer.

ADVANTAGE - Economical efficiency is improved and battery characteristics are excellent.

L135 ANSWER 16 OF 22 WPIX COPYRIGHT 2009 THOMSON REUTERS ON STN
 AN 2001-235455 [25] WPIX Full-text
 DNC C2001-070740 [25]
 DNN N2001-168350 [25]
 TI New lithium insertion-type electrode materials based on orthosilicate derivatives for use in, e.g. electrochemical cells and primary and secondary batteries
 DC A85; L03; V01; X16
 IN ARMAND M; HOVINGTON P; MICHOT C; RAVET N; SIMONEAU M
 PA (CNRS-C) CENT NAT RECH SCI; (HYDR-N) HYDRO-QUEBEC; (UYMO-N) UNIV MONTREAL
 CYC 1
 PIA CA 2271354 A1 20001110 (200125)* EN 18[0] <--
 ADT CA 2271354 A1 CA 1999-2271354 19990510
 PRAI CA 1999-2271354 19990510
 AB CA 2271354 A1 UPAB: 20050525
 NOVELTY - Lithium insertion-type electrode materials based on orthosilicate derivatives are new.
 DETAILED DESCRIPTION - Lithium insertion-type electrode materials, which are based on orthosilicate derivatives, of formula $\text{Li}_x\text{M}_m\text{-wDdTtQqRr}(\text{SiO}_4)_1\text{-y}(\text{SO}_4)_s(\text{PO}_4)_p(\text{GeO}_4)_g(\text{VO}_4)_v(\text{A } 10_4)_a(\text{BO}_4)_b$ are new. $\text{M} = \text{Mn}^{2+}$ and/or Fe^{2+} ; $\text{D} =$ a metal having +2 oxidation state, preferably Mg^{2+} , Ni^{2+} , Co^{2+} , Zn^{2+} , Cu^{2+} , Ti^{2+} , V^{2+} , or Ca^{2+} ; $\text{T} =$ a metal having +3 oxidation state, preferably Al^{3+} , Ti^{3+} , Cr^{3+} , Fe^{3+} , Mn^{3+} , Ga^{3+} , Zn^{3+} , V^{3+} ; $\text{Q} =$ a metal having +4 oxidation state, preferably Ti^{4+} , Ge^{4+} , Sn^{4+} , V^{4+} ; $\text{R} =$ a metal having +5 oxidation state, preferably V^{5+} , Nb^{5+} , Ta^{5+} ; $s, p, g, v, a, b =$ respective stoichiometric coefficient for S^{5+} (sulfate), P^{5+} (phosphate), Ge^{4+} (germanate), V^{5+} (vanadate), Al^{3+} (aluminate), and B^{3+} (borate) residing in the silicon tetrahedral sites; $d, t, q, r =$ stoichiometric coefficients, preferably 0-1 $\text{M}, \text{D}, \text{T}, \text{Q}, \text{R}$ are elements residing in octahedral or tetrahedral sites; $w = d + t + q + r$; $y = p + s + g + v + a + b$; $d, t, q, r, p, s, v, a, b$ are all positive, preferably 0-1; $0 \leq \text{at most } 2$; $1 \leq \text{at most } 2$; $(p + s + v + a + b)$ is less than 1; and $x + 2m + t + 2q + 3r = 4 - p - 2s - v + a + b$. INDEPENDENT CLAIMS are also included for (a) an electrical generator having positive electrode(s) containing (I) and negative electrode(s) as a source of lithium ion at a high chemical activity, and (b) a variable optical transmission device constructed from transparent semiconductor coated glass or plastic, and two electrode(s) containing (I) and separated by solid gel electrolytes.
 USE - For use as electrode materials for electrochemical cells, and primary and secondary batteries in which the negative electrode is a source of lithium ions. It can also be used in supercapacitors.
 ADVANTAGE - The inventive electrode materials can be easily prepared and have capacities of 160 mAh/g in excess of the conventional electrode materials. It is capable of preventing leaching of transition metals into the electrolyte

due to the high charge of the orthosilicate anion, which binds selectively the charged cations, including the transition elements.

TECH

INORGANIC CHEMISTRY - Preferred Material: The negative electrode is a metallic lithium or a lithium alloy, which can be nanodispersed in lithium oxide; a lithium intercalation compound carbon or carbonaceous matters resulting from the pyrolysis of organic derivatives; a lithium-titanium spinel ($\text{Li}_{1+x}\text{Ti}_2\text{-x/4O}_4$), where 0at mostx and 0at mosty at most1 and its solid solutions with other spinels; and/or a lithium-transition metal mixed nitride. **Preferred Components:** The positive electrode contains a conductive additive, preferably carbon. It has an electrode material of formula $\text{Li}_{\text{approximately}}\text{Fe}_m\text{Mn}_m\text{Si}_s\text{PpO}_4$, where $(f + m)$ at most1.2, $s + p = 1$, 0at mostpat most0.6, and $(8-5p-4s-2m-2f)$ at leastlambda daat least $(8-5p-4s-4m-3f)$. It may also comprise another intercalation material, preferably a lamellar dichalcogenide, a vanadium oxide (VOx) (where 2.1at mostx at most2.5), or a Nasicon-related material, e.g. $\text{Li}_3\text{Fe}_2(\text{PO}_4)_3$.

POLYMERS - Preferred Component: The positive electrode may also contain a polymeric binder which can be a homopolymer or a copolymer of tetrafluoroethylene, or an ethylene-propylene-diene terpolymer. **Preferred Binder:** The polymeric binder is preferably polyether, polyester, methylmethacrylate-based polymer, acrylonitrile-based polymer, or vinylidene fluoride-based polymer.

ORGANIC CHEMISTRY - Preferred Component: The positive electrode may also contain an aprotic solvent, preferably ethylene carbonate, propylene carbonate, dimethylcarbonate, diethylcarbonate, methyl-ethylcarbonate, gamma-butyrolactone, tetraalkylsulfamide, and/or dialkyl ether of mono-, di-, tri-, or higher oligo- ethylene glycols with at most2000 molecular weight.

L135 ANSWER 17 OF 22 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
 AN 2000-657686 [64] WPIX Full-text
 DNC C2000-199134 [64]
 DNN N2000-487611 [64]
 TI Electrode, especially for a lithium cell containing a dry or gel-type polymer or liquid aprotic electrolyte, comprises a metallic current collector with a conductive mineral binder coating for preventing passivating film formation
 DC A85; L03; P42; X16
 IN ARMAND M; BELANGER A; BESNER S; GAUTHIER M; HAMELIN H; MAGNAN J
 PA (ARMA-I) ARMAND M; (BELA-I) BELANGER A; (BESN-I) BESNER S; (GAUT-I) GAUTHIER M; (HAME-I) HAMELIN H; (HYDR-N) HYDRO-QUEBEC; (MAGN-I) MAGNAN J
 CYC 28
 PIA EP 1043790 A1 20001011 (200064)* FR 13[4] <--
 CA 2268355 A1 20001007 (200064) FR <--
 CA 2304395 A1 20001007 (200064) FR <--
 JP 2000340234 A 20001208 (200104) JA 31 <--
 US 6485866 B1 20021126 (200281) EN
 US 20030022067 A1 20030130 (200311) EN
 US 6844114 B2 20050118 (200506) EN
 EP 1043790 B1 20050803 (200551) FR
 DE 60021643 E 20050908 (200561) DE
 DE 60021643 T2 20060524 (200635) DE
 ADT EP 1043790 A1 EP 2000-420069 20000406; CA 2268355 A1 CA 1999-2268355 19990407; CA 2304395 A1 CA 2000-2304395 20000406; DE 60021643 E DE 2000-621643 20000406; DE 60021643 E EP 2000-420069 20000406; US 6485866 B1 US 2000-544133 20000406; US 20030022067 A1 Cont. of US 2000-544133 20000406; US 6844114 B2 Cont. of US 2000-544133 20000406; JP 2000340234 A JP 2000-106429 20000407; US 20030022067 A1 US 2002-252580 20020924; US

6844114 B2 US 2002-252580 20020924; DE 60021643 T2 DE 2000-621643
 29990406; DE 60021643 T2 EP 2000-420069 29990406

FDT DE 60021643 E Based on EP 1043790 A; US 20030022067 A1 Cont of
 US 6485866 B; US 6844114 B2 Cont of US 6485866 B; DE
 60021643 T2 Based on EP 1043790 A

PRAI CA 1999-2263355 19990407

AB EP 1043790 A1 UPAB: 20060117

NOVELTY - An electrochemical cell electrode, comprising a metallic current collector with a conductive mineral binder coating for protection against passivating film formation, is new.

DETAILED DESCRIPTION - An electrochemical power cell has an electrolyte separator between two electrodes, one or each of which comprises a metallic current collector covered with a compatible protective conductive coating which comprises a mineral binder optionally containing a dispersed electronic conduction additive for ensuring electron exchange between the electrode and the collector and which is in tight contact with the collector to protect the metallic surface against passivating film formation.

INDEPENDENT CLAIMS are also included for the following: (i) application of a current protective coating on the metallic collector of an electrode by applying an aqueous solution or dispersion of a mineral binder optionally containing a dispersed electronic conduction additive and then drying; and (ii) an electrode as described above.

USE - As a lithium cell especially containing aluminum current collectors and a dry or gel-type polymer or liquid aprotic electrolyte, useful for a wide range of stationary or mobile applications ranging from portable electronic equipment to electric or hybrid vehicles.

ADVANTAGE - The mineral binder does not undergo acid/base reactions with electronic conduction additives or electrode active materials, wets and protects the current collector surface against corrosion/passivation reactions and does not require application over the entire collector surface (especially when a dry polymer medium is used) so that the requisite quantity of mineral binder is reduced.

TECH ELECTRICAL POWER AND ENERGY - Preferred Materials: The coating contains a glass former. The electronic conduction additive is selected from carbon black, graphite, metals, mineral compounds exhibiting metallic conductivity, doped conjugated polymers and their mixtures and/or an electrochemically active material acting as an electrode material which is similar to or different from the adjacent active electrode. The electronic conduction additive is especially a carbon black or graphite present in amount 2-20 vol.%. The adjacent electrode may be an anode or preferably a cathode having a collector of aluminum or an aluminum based metallization or comprises a vanadium oxide or a transition metal phosphate of NASICON structure. The mineral binder is a (partially) vitreous alkali metal (especially lithium and/or potassium) phosphate, polyphosphate, borate or polyborate.

POLYMERS - The electronic conduction additive may be a doped conjugated polymer.

ABEX EXAMPLE - An aqueous (HPO₃)_n solution was neutralized with LiOH and mixed with Ketjenblack (RTM) EC-600 carbon black in amount 8 vol.% with respect to glass of formula (LiPO₃)_n. The suspension was applied onto a 13 μ thick aluminum collector and dried at 150degreesC to form a 3 μ thick coating. The resulting coating had a shiny appearance, was adherent and exhibited surface electronic conductivity.

L135 ANSWER 18 OF 22 WPXI COPYRIGHT 2009 THOMSON REUTERS ON STN
 AN 1999-207800 [18] WPXI Full-text
 DNC C1999-060760 [18]
 DNN N1999-153167 [18]
 TI Active material for lithium cells - has olivine structure

expressed by predetermined structural formula

DC L03; X16

IN KARIRU A

PA (NIST-C) JAPAN STORAGE BATTERY CO LTD

CYC 1

PIA JP 11025983 A 19990129 (199918)* JA 22[4]

<--

ADT JP 11025983 A JP 1997-215424 19970704

PRAI JP 1997-215424 19970704

AB JP 11025983 A UPAB: 20060115

NOVELTY - The active material has olivine structure which is expressed by the formula LiM1-XMeXP04 , where (M: Co, Ni, Mn), (Me: Mg, Fe, Ni, Co, Mn, Zn, Ge, Cu, Cr), $0 \leq X \leq 0.5$.

USE - As anode active material for lithium cells (claimed).

ADVANTAGE - The capacitance and potential of battery is improved.

L135 ANSWER 19 OF 22 WPIX COPYRIGHT 2009

THOMSON REUTERS on STN

AN 1999-096387 [09] WPIX Full-text

DNC C1999-028552 [09]

DNN N1999-070079 [09]

TI Lithium insertion type anode active material - has olivine structure and is based on iron or manganese derivatives

DC A85; L03; X16

IN ARMAND M; CHOQUETTE Y; SIMONEAU M; ZAGHIB K

PA (HYDR-N) HYDRO-QUEBEC

CYC 1

PIA CA 2200998 A 19980925 (199909)* EN 5[0]

<--

ADT CA 2200998 A CA 1997-2200998 19970325

PRAI CA 1997-2200998 19970325

AB CA 2200998 A UPAB: 20060115

A lithium insertion type anode active material has an olivine structure and has the formula $\text{Li}_x\text{yM1}-(\text{y}+\text{d}+\text{t}+\text{q}+\text{r})\text{DdTtQqRr} [\text{PO4}]_1-(\text{p}+\text{s}+\text{v})[\text{SO4}]_p[\text{SiO4}]_s[\text{VO4}]_v$, where M is Fe^{2+} or Mn^{2+} or their mixtures, D is a metal with a +2 oxidation state chosen from Mg, Ni, Co, Zn, Cu and Ti, T is a metal with a +3 oxidation state chosen from Al, Ti, Cr, Fe, Mn, Ga and V, Q is metal with a +4 oxidation state chosen from Ti, Ge, Sn and V, R is a metal with a +5 oxidation state chosen from V, Nb and Ta; x, y, d, t, q, p, r, s, v are all between 0 and 1, with at least one of y, d, t, q, p, r, s, v differing from zero, with the conditions $0 \leq x \leq 1$, $\text{y}+\text{d}+\text{t}+\text{q}+\text{r} \leq 1$, $\text{p}+\text{s}+\text{v} \leq 1$, and $3+\text{s}-\text{p} = \text{x}-\text{y}+\text{t}+2\text{q}+3\text{r}$, x being the degree of intercalation during operation of the anode material. All M, D, T, Q, R elements reside in an octahedral site, and v is the stoichiometric coefficient for V^{5+} residing in tetrahedral sites.

Also claimed are an electrochemical cell containing an anode of the above material and at least one cathode being a source of Li ions at high chemical activity; and a variable optical transmission device constructed of transparent semiconductor coated glass or plastic, and with two electrodes containing the above material separated by a solid or gel electrolyte. Preferably, the anodes contain as binder a homopolymer or copolymer of TFE or an ethylene-propylene-diene terpolymer, which also has ionic conductivity, an optionally crosslinked polyether dissolving an Li salt, a polyester, a methacrylate-based polymer, an acrylonitrile-based polymer, or a vinylidene fluoride-based polymer. The binder is swollen by an aprotic solvent selected from ethylene carbonate, propylene carbonate, dimethylcarbonate, diethylcarbonate, methylethylcarbonate, gamma-butyrolactone, tetraalkyl sulphamide, dialkylether of mono-, di-, tri-, tetra- or higher oligoethylene glycols of mol. weight up to 2000, and their mixtures.

ADVANTAGE - Better Li ion diffusivity and electronic conductivity.

L135 ANSWER 20 OF 22 WPIX COPYRIGHT 2009

THOMSON REUTERS on STN

AN 1997-536126 [49] WPIX Full-text
DNC C1997-171492 [49]
DNN N1997-446285 [49]
TI Cathode materials for rechargeable secondary lithium batteries
- comprising transition metal compounds with ordered olivine or
rhombohedral NASICON structure containing phosphate ions.
DC E31; L03; X16
IN ARMAND M; GOODENOUGH B; GOODENOUGH J B; MASQUELIER C; NANJUNDASWAMY K S;
NANJUNDASWAMY S; PADHI A; PADHI A K; PAHDI A; PAHDI A K; GOODENOUGH J B;
NANJUNDASWAMY
PA (ARMA-I) ARMAND M; (GOOD-I) GOODENOUGH J B; (MASQ-I) MASQUELIER C;
(NANJ-I) NANJUNDASWAMY K S; (PADH-I) PADHI A K; (TEXA-C) UNIV TEXAS SYSTEM
CYC 20
PIA WO 9740541 A1 19971030 (199749)* EN 48[15] <--
EP 904607 A1 19990331 (199917) EN <--
US 5910382 A 19990608 (199930) EN <--
JP 2000509193 W 20000718 (200037) JA 41 <--
US 6391493 B1 20020521 (200239) EN <--
US 6514640 B1 20030204 (200313) EN
US 20030082454 A1 20030501 (200331) EN
EP 904607 B1 20041027 (200471) EN
DE 69731382 E 20041202 (200479) DE
US 20050003274 A1 20050106 (200504) EN
EP 1501137 A2 20050126 (200508) EN
US 20050244321 A1 20051103 (200573) EN
DE 69731382 T2 20060223 (200615) DE
CA 2543784 A1 19971030 (200649) EN <--
CA 2251709 C 20060801 (200652) EN
EP 1755182 A1 20070221 (200717) EN
EP 1755183 A1 20070221 (200717) EN
US 20070117019 A1 20070524 (200735) EN
US 20070166618 A1 20070719 (200749) EN
JP 2007214147 A 20070823 (200757) JA 21
JP 2007294463 A 20071108 (200774) JA 22
US 20070281215 A1 20071206 (200781) EN
US 5910382 C1 20080415 (200829) EN
ADT WO 9740541 A1 WO 1997-086671 19970423; US 5910382 A Provisional
US 1996-16060P 19960423; US 6391493 B1 Provisional US
1996-16060P 19960423; US 6514640 B1 Provisional US 1996-16060P
19960423; US 20030082454 A1 Provisional US 1996-16060P
19960423; US 20050003274 A1 Provisional US 1996-16060P
19960423; US 20050244321 A1 Provisional US 1996-16060P
19960423; US 20070117019 A1 Provisional US 1996-16060P
19960423; US 20070166618 A1 Provisional US 1996-16060P
19960423; US 20070281215 A1 Provisional US 1996-16060P
19960423; US 5910382 A Provisional US 1996-32346P 19961204;
US 6391493 B1 Provisional US 1996-32346P 19961204; US 6514640 B1
Provisional US 1996-32346P 19961204; US 20030082454 A1
Provisional US 1996-32346P 19961204; US 20050003274 A1
Provisional US 1996-32346P 19961204; US 20050244321 A1
Provisional US 1996-32346P 19961204; US 20070117019 A1
Provisional US 1996-32346P 19961204; US 20070166618 A1
Provisional US 1996-32346P 19961204; US 20070281215 A1
Provisional US 1996-32346P 19961204; US 5910382 A US
1997-840523 19970421; US 6391493 B1 Div Ex US 1997-840523
19970421; US 6514640 B1 CIP of US 1997-840523 19970421; US
20030082454 A1 CIP of US 1997-840523 19970421; US 20050003274 A1
CIP of US 1997-840523 19970421; US 20050244321 A1 CIP of US
1997-840523 19970421; US 20070117019 A1 CIP of US 1997-840523
19970421; US 20070166618 A1 CIP of US 1997-840523 19970421;

US 20070281215 A1 CIP of US 1997-849523 19970421; CA 2543784 A1
 Div Ex CA 1997-2251709 19970423; CA 2251709 C CA
 1997-2251709 19970423; CA 2543784 A1 CA 1997-2543784 19970423
 ; DE 69731382 E DE 1997-69731382 19970423; DE 69731382 T2
 DE 1997-69731382 19970423; EP 904607 A1 EP 1997-923437
 19970423; EP 904607 B1 EP 1997-923437 19970423; DE 69731382
 E EP 1997-923437 19970423; EP 1501137 A2 Div Ex EP
 1997-923437 19970423; DE 69731382 T2 EP 1997-923437 19970423
 ; JP 2000509193 W JP 1997-538259 19970423; JP 2007214147 A Div
 Ex JP 1997-538259 19970423; JP 2007294463 A Div Ex JP
 1997-538259 19970423; EP 904607 A1 WO 1997-US6671 19970423;
 JP 2000509193 W WO 1997-US6671 19970423; EP 904607 B1 WO
 1997-US6671 19970423; DE 69731382 E WO 1997-US6671 19970423
 ; DE 69731382 T2 WO 1997-US6671 19970423; CA 2251709 C WO
 1997-US6671 19970423; EP 1755182 A1 Div Ex EP 1997-923437
 19971020; EP 1755183 A1 Div Ex EP 1997-923437 19971030; US
 6514640 B1 US 1997-998264 19971224; US 20030082454 A1 Cont of
 US 1997-998264 19971224; US 20050003274 A1 Cont of US
 1997-998264 19971224; US 20050244321 A1 Cont of US 1997-998264
 19971224; US 20070117019 A1 Cont of US 1997-998264 19971224
 ; US 20070166618 A1 Cont of US 1997-998264 19971224; US
 20070281215 A1 Cont of US 1997-998264 19971224; US 6391493 B1
 US 1999-296080 19990423; US 20030082454 A1 US 2002-307346 20021202
 ; US 20050003274 A1 Cont of US 2002-307346 20021202; US 20050244321 A1
 Cont of US 2002-307346 20021202; US 20070117019 A1 Cont of US 2002-307346
 20021202; US 20070166618 A1 Cont of US 2002-307346 20021202; US
 20070281215 A1 Cont of US 2002-307346 20021202; EP 1501137 A2 EP
 2004-22447 19970423; US 20050003274 A1 US 2004-902142 20040730; US
 20050244321 A1 Cont of US 2004-902142 20040730; US 20070117019 A1 Cont of
 US 2004-902142 20040730; US 20070166618 A1 Cont of US 2004-902142
 20040730; US 20070281215 A1 Cont of US 2004-902142 20040730; EP 1755182 A1
 Div Ex EP 2004-22447 20040921; EP 1755183 A1 Div Ex EP 2004-22447
 20040921; US 20050244321 A1 US 2005-179617 20050713; US 20070117019 A1
 Cont of US 2005-179617 20050713; US 20070166618 A1 Cont of US 2005-179617
 20050713; US 20070281215 A1 Cont of US 2005-179617 20050713; EP 1755182 A1
 EP 2006-20470 19970423; EP 1755183 A1 EP 2006-21083
 19970423; US 20070117019 A1 US 2006-647899 20061229; US 20070166618
 A1 US 2006-648316 20061229; JP 2007294463 A JP 2007-128681 20070514; JP
 2007214147 A JP 2007-128682 20070514; US 20070281215 A1 US 2007-890130
 20070803; US 5910382 C1 Provisional US 1996-16060F 19960423; US
 5910382 C1 Provisional US 1996-32346P 19961204; US 5910382 C1
 US 1997-849523 19970421

FDT EP 1755182 A1 Div ex EP 1501137 A; EP 1755183 A1 Div ex EP
 1501137 A; DE 69731382 E Based on EP 904607 A; EP 1501137
 A2 Div ex EP 904607 A; DE 69731382 T2 Based on EP 904607
 A; EP 1755182 A1 Div ex EP 904607 A; EP 1755183 A1 Div ex
 EP 904607 A; US 6391493 B1 Div ex US 5910382 A; US 6514640
 B1 CIP of US 5910382 A; US 20030082454 A1 CIP of US 5910382 A;
 US 20050003274 A1 CIP of US 5910382 A; US 20050244321 A1 CIP of US
 5910382 A; US 20070117019 A1 CIP of US 5910382 A; US
 20070166618 A1 CIP of US 5910382 A; US 20030082454 A1 Cont of US
 6514640 B; US 20050003274 A1 Cont of US 6514640 B; US
 20050244321 A1 Cont of US 6514640 B; US 20070117019 A1 Cont of US
 6514640 B; US 20070166618 A1 Cont of US 6514640 B; EP 904607
 A1 Based on WO 9740541 A; JP 2000509193 W Based on WO 9740541
 A; EP 904607 B1 Based on WO 9740541 A; DE 69731382 E Based
 on WO 9740541 A; DE 69731382 T2 Based on WO 9740541 A; CA
 2251709 C Based on WO 9740541 A; US 20070281215 A1 CIP of US
 5910382 A; US 20070281215 A1 Cont of US 6514640 B
 PRAI US 1996-32346P 19961204

US 1996-16060F 19960423
 US 1997-810523 19970421
 US 1997-998264 19971224
 US 1999-294080 19990423
 US 2002-307346 20021202
 US 2004-902142 20040730
 US 2005-179617 20050713
 US 2006-647899 20061229
 US 2006-648316 20061229
 US 2007-890130 20070803

AB WO 1997040541 A1 UPAB: 20060113

Cathode material for a rechargeable electrochemical cell having the formula LiMPO_4 where M is at least one first row transition metal cation. Also claimed (II) is the material comprising a rhombohedral NASICON material of the formula $\text{YxM}_2(\text{PO}_4)_3$ where M is a first row transition metal cation and $0 \leq x \leq 5$ and Y is Li or Na. Also claimed (III) is the material comprising a rhombohedral NASICON material of the formula $\text{YxM}_2(\text{PO}_4)_y(\text{XO}_4)_{3-y}$ where M is a first row transition metal cation and $0 \leq x \leq 5$, $0 \leq y \leq 3$, Y is Li or Na, and X is Si, As, or S. Also claimed (IV) is the material comprising a rhombohedral NASICON material of the formula $\text{A}_3\text{-xV}_2(\text{PO}_4)_3$ where A is Li or Na or their combination and $0 \leq x \leq 2$. Also claimed is a secondary battery including a cathode formed from the materials in (I) - (IV)
 USE - Electrodes for secondary lithium batteries.
 ADVANTAGE - Materials are environmentally benign.

L135 ANSWER 21 OF 22 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN

AN 1996-484897 [48] WPIX Full-text
 CR 1995-240033; 1995-350683; 1996-455404; 1997-033478
 DNC C1996-151877 [48]

TI Solid-state, battery-driven, fluid-dispensing micro-pumps - can deliver a constant flow of fluid over extended periods of time

DC B07; J03; X25

IN GORDON J H; JOSHI A V; SHEN Y

PA (CERA-N) CERAMATEC INC

CYC 1

PIA US 5567287 A 19961022 (199648)* EN 15[8] <--

ADT US 5567287 A CIP of US 1993-58438 19930507; US 5567287 A Div Ex
 US 1994-301116 19940906; US 5567287 A US 1995-495211
 19950627

FDT US 5567287 A Div ex US 5427870 A; US 5567287 A CIP of US 5454922 A

PRAI US 1995-495211 19950627
 US 1993-58438 19930507
 US 1994-301116 19940906

AB US 5567287 A UPAB: 20050826

The following are claimed (A) solid state, battery driven, fluid dispensing micro-pump, comprising (a) an electrolyte comprising an ion transport material selected from the class of materials which transport A cations or A' cations, (b) a solid anode material of the general form AxOy or A'bNb (where A is a cation with an oxidation state of $2y/x$ as A ions migrate across the ion conducting electrolyte, or as oxygen is released from the solid anode ions migrate across the solid ion conducting electrolyte, A' is a cation of oxidation state $3b/a$ as A ions migrate across the ion conducting electrolyte, $x = 1-3$, $y = 1-4$, $a = 1-3$ and $b = 1-3$, (c) a solid cathode material comprising a halogen ionisable to a minus one valence state or a cpd. comprising carbon and halogen ionisable to a mixture of carbon and halogen with a valence of minus one state or a Gp.VIB substance ionisable to a minus two valence state, or where the migrating cations are reduced to elemental state at the cathode, (d) a fluid containing chamber having a fluid discharge outlet, and (e) duct

means providing gas communication between the anode compartment and the fluid containing chamber; (B) a solid state, electrically self-contained, fluid dispensing micropump, comprising (a) an electrochemical cell having an anode compartment, a cathode compartment and solid electrolyte separating the anode and cathode compartments, (b) a solid anode material of the general form $BxOy$ or $B'anB$ (where B is a cation of silver or copper metal, and B' is a cation of sodium or lithium metal), (c) an electrolyte comprising an ion transport material selected from the class of materials which transport B cations or B' cations, (d) a solid cathode material (in intimate contact with the electrolyte) comprising a halogen ionisable to a minus one valence state or a cpd. comprising carbon and halogen ionisable to a mixture of carbon and halogen with a valence of minus one state or a Gp.VIB substance ionisable to a minus two valence state, (e) an electrical conductor connectable between the anode and cathode materials, which upon connection results in oxygen or nitrogen being released from the anode material as the cation present; B or B' migrates through the electrolyte to react with the cathodic material in a reaction which includes the electrons released at the anode, (f) a fluid containing chamber having a fluid discharge outlet, and (g) duct means providing gas communication between the anode compartment and the fluid containing chamber; and (C) a fluid dispensing micropump, comprising (a) a miniature solid state, self-contained, gas-producing galvanic electrochemical cell, (b) a fluid containing chamber having a fluid discharge outlet, and (c) duct means providing gas communication between the cell and the fluid containing chamber.

USE - The devices dispense a fluid at a slow, steady, predictable rate over an extended period of time. The fluid itself may have beneficial properties or it may contain chemicals or nutrients which provide a benefit or which inhibit something undesirable in a system or living organism. The fluid can be delivered to a specific site through appropriate tubing or connections or it can be delivered to an external portion of the device where it is allowed to evaporate into a room, vehicle, container or other environment surrounding the dispenser.

ADVANTAGE - The devices deliver the fluid over a nearly constant rate over an extended period of time. They have a simple design which is conducive to fabrication. They do not require exposure to air, fluid or the pre-charging of an electrochemically active gas to function. They do not utilise polymeric ion-exchange membranes which typically must remain hydrated to some degree to function, and which are affected by humidity, which can cause changes in conductivity, gas flow and dispensing rates.

L135 ANSWER 22 OF 22 WPIX COPYRIGHT 2009

THOMSON REUTERS on STN

AN 1988-141582 [21] WPIX Full-text

DNC C1988-063018 [21]

DNN N1988-108130 [21]

TI Electrode based on solid electrolyte - determines sodium concentration in solns. faster and with better selectivity

DC E34; J04; L03; S03

IN AMMENDE S; ERDMANN H; ETZKORN H W; ZUCHOLL K

PA (BATT-C) BATTELLE-INST EV

CYC 8

PIA EP 268032 A 19880525 (198821)* DE 4[4]

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DE 3639312 A 19880526 (198822) DE

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JP 63138253 A 19880610 (198829) JA

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EP 268032 B 19900829 (199035) EN

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DE 3764608 G 19901004 (199041) DE

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US 5122254 A 19920616 (199227) EN 4[4]

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ADT EP 268032 A EP 1987-113261 19870911; US 5122254 A Cont of

US 1978-121915 19781117; DE 3639312 A DE 1986-3639312

19861117; DE 3764608 G DE 1986-3639312 19861117; JP

63138253 A JP 1987-282936 19871109; US 5122254 A US
1989-348013 19890123

PRAI DE 1986-3639312 19861117
AB EP 268032 A UPAB: 20050428

As Na-sensitive membrane (2) a solid electrolyte is used with a Na(+)-ion conductivity of at least 10 power(-6) S/cm at room temperature A pref. cpd. is Nasicon, with the general formula $\text{NaI} + x\text{Zr}_2\text{SixP}_3 - x\text{O}_2$ in which x is 0-3. The reference electrode used (5) is a solid reference system pref. based on 2-phase mixts. with a stable Na(+)-ion activity, e.g., NaW- or NaMo-bronze, which is deposited directly on the solid electrolyte (2). For the connection electrode (3) a conventional electrode system is used. USE/ADVANTAGE - The electrode is more selective and has a faster reaction time. It can be constructed at low cost and in large quantities. It is mechanically robust and can be stored in dry condition.

=> d his

(FILE 'HOME' ENTERED AT 10:46:55 ON 27 JAN 2009)
SET COST OFF

FILE 'HCAPLUS' ENTERED AT 10:47:14 ON 27 JAN 2009

L1 1 S US20060035150/PN OR (US2005-518560# OR WO2003-EP6628 OR EP200
E AUDEMER/AU
L2 8 S E4,E5
E ALBANE/AU
E WURM/AU
L3 35 S E3,E18-E20
E WUERM/AU
E MORCRETE/AU
L4 85 S E8,E9
E GWIZDALA/AU
L5 3 S E12,E15
E MASQUELIER/AU
L6 99 S E7,E9,E10
E UMICOR/CO
L7 322 S E4-E37/CO,PA,CS
E E4+ALL
L8 523 S E2+RT OR E2-E17/PA,CS
SEL RN L1

FILE 'REGISTRY' ENTERED AT 10:52:24 ON 27 JAN 2009

L9 7 S E1-E7
L10 2 S 7782-42-5 OR 7440-44-0
E NASICON
L11 3 S E3
L12 1 S L9 AND (FE AND O AND P AND LI)/ELS
L13 120 S 7664-38-2/CRN AND (LI AND FE)/ELS
L14 11 S L13 AND 3/NC
L15 9 S L14 NOT (MNS/CI OR LITHIUM 6)
L16 9 S L12,L15
L17 1 S ETHYLENE GLYCOL/CN
L18 1 S CITRIC ACID/CN
L19 12 S 7664-38-2/CRN AND LI/ELS AND 2/NC
L20 7 S L19 AND H3O4P NOT (MNS/CI OR 6LI)
L21 1 S L9 AND HNO3
L22 13 S 7697-37-2/CRN AND FE/ELS AND 2/NC
L23 7 S L22 AND NR=>=1

L24 6 S L22 NOT L23
 L25 5 S L24 NOT 55FE
 L26 934 S (7664-38-2 OR 7664-93-9)/CRN AND (LI/ELS OR LITHIUM OR 7439-9
 L27 371 S L26 AND (TI OR V OR CR OR MN OR FE OR CO OR NI OR SC OR NB)/E
 L28 0 S L26 AND (7440-32-6 OR 7440-62-2 OR 7440-47-3 OR 7439-95-4 OR
 L29 368 S L26 AND (TITANIUM OR VANADIUM OR CHROMIUM OR MANGANESE OR IRO
 L30 371 S L27, L29
 L31 368 S L30 NOT (AYS OR TIS)/CI
 L32 3 S L30 NOT L31
 L33 73 S L31 AND 3/NC
 L34 70 S L33 NOT (MNS/CI OR LITHIUM 6)
 L35 70 S L16, L34

FILE 'HCAPLUS' ENTERED AT 11:07:28 ON 27 JAN 2009

L36 284 S L11
 L37 1312 S NASICON#
 L38 483 S (LI OR ?LITHIUM?) (S) OLIVINE
 E OLIVINE/CW, CT
 L39 10774 S E3-E21
 L40 55 S L39 (L) (LI OR LITHIUM)
 E E4+ALL
 E E2+ALL
 L41 73 S E3+OLD, NT (L) (LI OR LITHIUM)
 L42 12482 S L36-L41
 L43 2133 S L35
 L44 16 S L1-L8 AND L42
 L45 33 S L1-L8 AND L43
 L46 38 S L44, L45
 L47 428 S L42 AND L10
 L48 751 S L43 AND L10
 L49 2104 S L42 AND ?CARBON?
 L50 1125 S L43 AND ?CARBON?
 L51 270 S L42 AND GRAPHITE
 L52 300 S L43 AND GRAPHITE
 L53 3245 S L49-L52
 L54 391 S L53 AND ?COAT?
 L55 36 S L53 AND B05D/IPC, IC, ICM, ICS, EPC
 L56 2 S L53 AND C09C003-10/IPC, IC, ICM, ICS, EPC
 E COATING/CT
 E E12+ALL
 L57 32 S L53 AND E42+OLD, NT
 L58 58 S L53 AND E2+OLD, NT
 L59 443 S L53 AND ?POLYM?
 L60 82 S L53 AND POLYM?/CW, CT
 E POLYMERIZATION/CT
 E E3+ALL
 L61 8 S L53 AND E2+OLD, NT
 L62 443 S L59-L61
 L63 138 S L62 AND L54-L58
 L64 11 S L63 AND (L17 OR ETHYLENEGLYCOL OR ETHYLENE GLYOL OR ETHANEDIO
 L65 7 S L63 AND (POLYHYDR?(L)ALCOHOL OR POLYCARBOXYL?)
 L66 4 S L63 AND ALCOHOL?/CW, CT (L) POLYHYDR?
 L67 8 S L63 AND CARBOXYLIC?/CW, CT
 L68 20 S L64-L67
 L69 9 S L68 AND (H2O OR WATER OR SOLUTION)
 L70 6 S L68 AND (L20 OR L25)
 L71 6 S L10 AND L70
 L72 9905 S L42, L43 AND PY<=2002 NOT PDT
 L73 651 S L42, L43 AND (PD<=20020621 OR PRD<=20020621 OR AD<=20020621) A
 L74 9983 S L72, L73


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L75      288 S L74 AND L10
L76      720 S L74 AND (CARBON OR GRAPHITE)
L77      737 S L75,L76
L78      79 S L77 AND ?POLYM?
L79      4 S L77 AND POLYMERIZATION+OLD,NT/CT
L80      27 S L77 AND POLYMER?/CW,CT
L81      2 S L77 AND C09C003-10/IPC, IC, ICM, ICS, EPC
L82      79 S L78-L81
L83      2 S L77 AND (POLYHYDR?(L)ALCOHOL OR POLYCARBOXYL?)
L84      2 S L77 AND ALCOHOL?/CW,CT (L) POLYHYDR?
L85      5 S L77 AND CARBOXYLIC?/CW,CT
L86      9 S L77 AND (L17 OR ETHYLENEGLYCOL OR ETHYLENE GLYOL OR ETHANEDIO
L87      84 S L82-L86
L88      21 S L87 AND ?COAT?
L89      8 S L87 AND COAT?/CW,CT
L90      12 S L87 AND L57,L58
L91      5 S L87 AND B05D/IPC, IC, ICM, ICS, EPC
L92      11 S L87 AND L20,L25
L93      28 S L87 AND (H2O OR WATER? OR SOLUTION)
L94      50 S L88-L93
L95      23 S L94 NOT (ELECTRODE OR BATTERY OR FUEL CELL OR ELECTR? CELL OR
L96      27 S L94 NOT L95
L97      27 S L96 AND (ELECTRODE OR BATTERY OR FUEL CELL OR ELECTR? CELL OR
L98      4 S L97 AND (?POWD? OR ?CYRS? OR ?GRANUL? OR SIZE)
L99      23 S L97 NOT L98
L100     18 S L46 AND L74
          SEL AN 1 3 4
L101     3 S L100 AND E1-E6
L102     29 S L98,L101,L99
L103     29 S L102 AND L1-L8,L36-L102,L10,L11,L16,L34,L17,L18,L20,L25
L104     25 S L103 AND H01M/IPC, IC, ICM, ICS, EPC
L105     26 S L103 AND (BATTERY OR FUEL CELL OR ELECTR? CELL)
L106     3 S L103 NOT L104,L105
L107     2 S L106 NOT L14:183726/DN
L108     28 S L105,L105,L107

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FILE 'HCAPLUS' ENTERED AT 11:43:24 ON 27 JAN 2009

FILE 'WPIX' ENTERED AT 11:43:58 ON 27 JAN 2009

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L109     285 S NASICON# OR (LI OR ?LITHIUM?)(S)OLIVINE
          E NASICON/CN
          E OLIVINE/CN
L110     3 S E3,E4
L111     15 S (RAXI1E OR RAW9NQ OR RA93J9)/DCN
L112     296 S L109,L111
L113     7 S L112 AND (L2528 OR L2506 OR L2664)/PLE
L114     69 S L112 AND PLE/FA
L115     1 S L112 AND (C09C003-10 OR C09C0003-10)/IPC, IC, ICM, ICS, EPC
L116     69 S L113-L115
L117     96 S L112 AND (PD<=20020621 OR PRD<=20020621 OR AD<=20020621)
L118     2 S L117 AND (G1025 OR R00822 OR G2108 OR R00419)/PLE
L119     2 S L117 AND (L2108 OR M2108 OR L2095 OR M2095)/PLE
L120     5 S L117 AND (L2391 OR M2391)/PLE
L121     3 S L117 AND (G0997 OR G1310 OR G4024)/PLE
L122     6 S L118-L121
L123     5 S L122 NOT MEDICAL/TI
L124     90 S L117 NOT L122
L125     51 S L124 AND (H01M/IPC, IC, ICM, ICS, EPC OR (Q7409 OR Q7341)/PLE OR
L126     39 S L124 NOT L125
L127     2 S L126 AND (2008-K32057 OR 1988-141582)/AN

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L128      34 S L125 AND ?LITHIUM?
L129      32 S L128 NOT (2008-D59849 OR 2007-686374)/AN
L130      39 S L123,L127,L129
L131      12 S L130 AND (?POWD? OR ?PELLET? OR ?GRANUL? OR SIZE)
L132       9 S L130 AND ?CRYS?
L133      16 S L131,L132
L134      17 S L123,L133
L135      22 S L130 NOT L134
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FILE 'WPIX' ENTERED AT 12:02:16 ON 27 JAN 2009

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